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Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB

Conducted and published for the Club, by
MERRITT LYNDON FERNALD, Editor-in-Chief
ALBERT FREDERICK HILL
STUART KIMBALL HARRIS } Associate Editors
RALPH CARLETON BEAN

VOLUME 51

1949

The New England Botanical Club, Inc.
8 and 10 West King St., Lancaster, Pa.
Botanical Museum, Oxford St., Cambridge 38, Mass.

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Vol. 51. January, 1949. No. 601.

CONTENTS:

Some Notes on Echinochloa. *Norman C. Fassett.* 1

Two Species of Oxybaphus in Indiana. *Edwin D. Hull.* 3

Zoochlorella conductrix occurring in New Brunswick Symbiotically with Ophrydium. *Herbert Habeeb and John J. Caldwell.* .. 4

An abbreviated Flora of Maine (Review). *M. L. F.* 5

Juncus Greenei and Rhus glabra in Quebec. *Marcel Raymond.* 9

Salicornia europaea in Illinois. *Glen S. Winterringer.* 11

Notes on four Virginia Plants. *Lena Artz.* 12

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SOME NOTES ON ECHINOCHLOA

NORMAN C. FASSETT

THE native North American *Echinochloa pungens* (Poir.) Rydb. was differentiated, under the name *E. muricata* (Michx.) Fernald, from the introduced *E. crusgalli* (L.) Beauv., by Fernald, RHODORA xvii. 106 (1915) and by Wiegand, RHODORA xxiii. 50–52 (1921). The characters separating them were largely quantitative; *E. muricata* was described as having the spikelets more bristly and the tip of the coriaceous lemma firmer than in *E. crusgalli*. Further to blur the differences between the species, two varieties of *E. muricata* were described by Wiegand, characterized by having less bristly spikelets.

It is therefore reassuring to observe a definite and qualitative, though minute, difference. In *E. crusgalli* the tip of the coriaceous lemma is dark, dull, wrinkled and sharply differentiated from the smooth lustrous body of the lemma; the lustrous portion bears, just below the junction with the wrinkled tip, a ring of minute setae. These setae are about the size of the smallest pubescence on the glumes and sterile lemma, and their detection requires considerable magnification. In *E. pungens* (*E. muricata*) the texture of the fertile lemma blends gradually from the smooth lustrous body to the dull wrinkled tip without a line of demarkation and without a ring of setae, although the distal portion of the withered tip is sometime setulose.

All of the European material of *E. crusgalli* in the Gray Herbarium was found to have the ring of setulae on the coriaceous lemma. Identifications of most North American collections,

separated into *E. crusgalli* and *E. pungens*, appear correct, with an unfortunate exception. A collection from Grand Tower, Illinois, *H. A. Gleason 1720*, with rather small and only slightly bristly spikelets, has a ring of setae on the coriaceous lemma, and is *E. crusgalli*. This sheet is the TYPE of *E. muricata* var. *occidentalis* Wiegand, and so the basis of *E. pungens* var. *occidentalis* (Wiegand) Fernald & Griscom, Rhodora xxxvii. 137 (1935) and of *E. occidentalis* (Wiegand) Rydberg, Brittonia i. 82 (1931). Wiegand's variety is good, and all his cited specimens clearly belong with it, excepting only the type. But the name must stand or fall with the type; *E. muricata* var. *occidentalis* becomes a synonym of *E. crusgalli* and a new name must be applied to the concept described by Wiegand.

Echinochloa pungens (Poir.) Rydb., var. **Wiegandii** nom. nov. *E. muricata* var. *occidentalis* Wiegand, Rhodora xxiii. 58 (1921), as to description and cited specimens except the TYPE. As TYPE of var. *Wiegandii* the following may be specified: sandy roadside, Hayden Island, Oregon, September 8, 1915, *J. C. Nelson 1974*, in the Gray Herbarium.

Professor Wiegand's treatment of the subdivisions of *E. muricata* recognizes essentially four recombinations of two sets of characters, involving the size and the armature of spikelets. Typical *E. muricata* (now typical *E. pungens*) has large bristly spikelets; var. *ludoviciana* has large less bristly spikelets; "var. *occidentalis*" (*E. pungens* var. *Wiegandii*) has smaller less bristly spikelets; and vars. *microstachya* and *multiflora* have small spikelets with many spreading bristles with swollen bases. Those who, like the present writer, are impressed with the long-acuminate spikelets (*multiflora*-like) and the long panicles reaching 30 or 35 cm. in specimens of var. *microstachya* from the northern states, and so find themselves unable to distinguish var. *multiflora* from var. *microstachya*, may unite them under the name var. *microstachya*.

The more recently described *E. pungens* var. *coarctata* Fernald & Griscom, Rhodora xxxvii. 136 (1935), "differs from the other described varieties in having the sterile lemma glabrous or merely puberulent on the back, with the bullate-based spicules few and marginal or very rarely on the keel." This is precisely the distribution of spicules on most material of typical *E. pungens*,

from which the writer is unable to separate the type specimen of var. *coarctata.* A second sheet determined as this variety, from Cornland, Norfolk Co., Virginia, *Fernald & Long 13881*, is quite different in aspect; its narrowly ellipsoid coriaceous lemma, awned second glumes, and slightly hispid sheaths place it with *E. Walteri.*

In *E. colonum* and *E. frumentacea* the coriaceous lemma has a ring of setae closely resembling that of *E. crusgalli. E. zelayensis* and *E. Walteri* lack the ring of setae.

In *E. crus-pavonis* and its var. *decipiens*[1] the tip of the coriaceous lemma is a little more sharply demarked from the lustrous body than in *E. pungens*, but there is no ring of setae. *E. crus-pavonis* has been much confused with *E. crusgalli* but the two may be readily separated by this character. *E. crus-pavonis* proves to be much more common in South America than is *E. crusgalli:* in fact there are in the Gray Herbarium but two sheets of the latter (both from Argentina) as against more than 30 of *E. crus-pavonis*, most of which had originally been labelled as *E. crusgalli.* In Mexico, *E. crusgalli* seems to be present but less common than *E. crus-pavonis.*

Department of Botany, University of Wisconsin.

Two Species of Oxybaphus in Indiana.—Both of these are included in Deam's "Excluded Species" in his "Flora of Indiana", each having been reported but once, and that long ago. *O. linearis* I found in considerable quantity in open rather sterile soil on the Nickel Plate Railroad east of Hobart in Lake Co., very near Porter Co. Deam says: "Reported in 1902 by Dorner as established along the Wabash Railroad near Lafayette." This is well over 100 miles from Hobart. I have known the species in the Hobart locality for many years, and, while it has not spread any considerable distance, it seems to be thoroughly established.

O. hirsutus Deam says was "reported to Coulter for Jenkins as found in Wabash Co." This station, while nearer Hobart than the preceding, is still a considerable distance away. This species I found in the same locality as *O. linearis*, and like it, it

[1] E. crus-pavonis (HBK.) Schult., var. **decipiens** (Wiegand) n. comb. *E. echinata* var. *decipiens* Wiegand, Rhodora xxiii. 61 (1921).

was in flower July 14, 1948. Plants are not so numerous, but are scattered over the area, and seem to be established.

Plants of both species have been sent to the Gray Herbarium.—Edwin D. Hull, Gary, Indiana.

ZOOCHLORELLA CONDUCTRIX OCCURRING IN NEW BRUNSWICK SYMBIOTICALLY WITH OPHRYDIUM

Herbert Habeeb and John J. Caldwell

While collecting Algae in the ledge-pools near the falls at Grand Falls, New Brunswick, one pool was found to contain delicate, green, jelly-like balls and clouds of what appeared macroscopically to be another member of *Tetrasporaceae.* On microscopic examination the specimens proved to be an infusorian with an included alga. They were identified as respectively, *Ophrydium* sp. (probably *versatile*) and *Zoochlorella conductrix* Brandt.

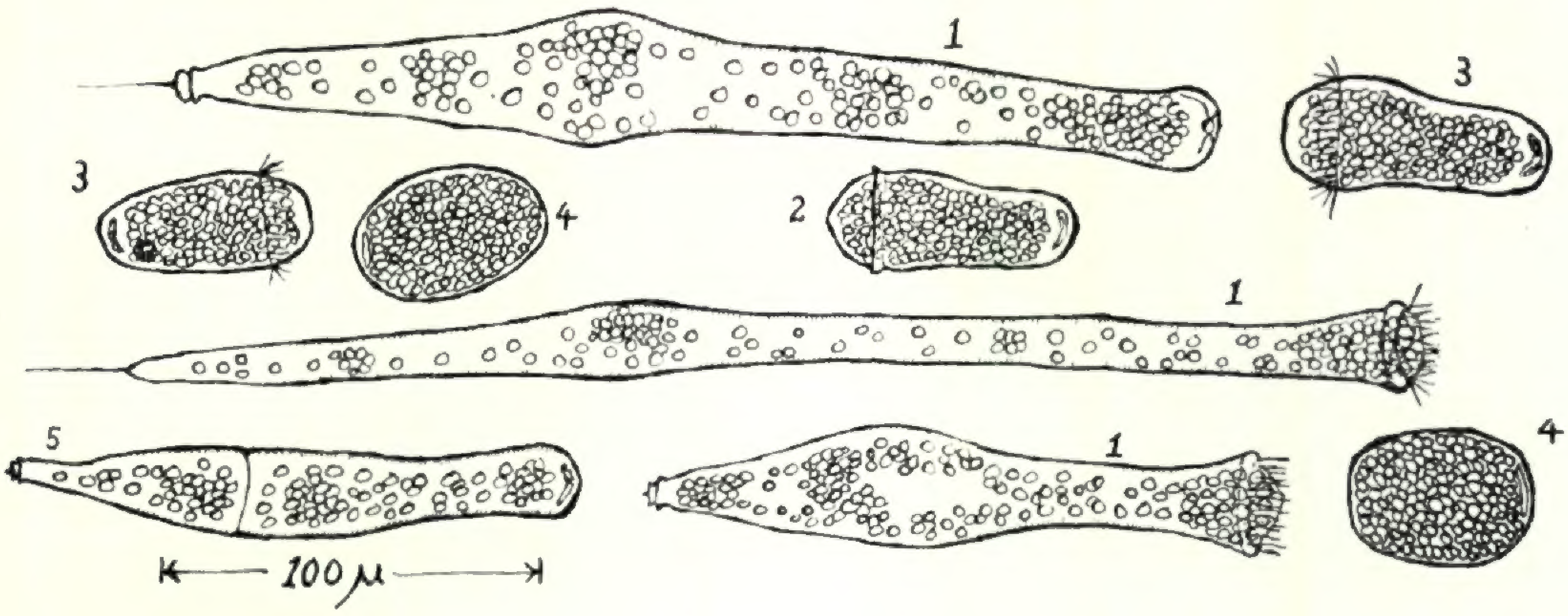
F. S. Collins in the *Green Algae of North America* (Tufts College Studies. Scientific series. **2:** 79–480. 1909) lists two species of *Zoochlorella* and separates them as follows:

Cells 3–6 microns diameter........................ *Z. conductrix*
Cells 1.5–3 microns diameter...................... *Z. parasitica*

Collins also mentions that *Z. conductrix* occurs in tissues of *Hydra* and allied freshwater organisms, while *Z. parasitica* Brandt occurs in tissues of *Spongilla,* in *Ophrydium* and in other freshwater organisms.

Measurements show that the *Zoochlorella* in our specimens average about 5 microns in diameter; placing the alga in *Zoochlorella conductrix.* This seems to indicate that the differences between *Z. conductrix* and *Z. parasitica* are slight or that *Ophrydium* is impartial as a host.

The *Ophrydium* stretched out in action measured up to 350 microns in length, the narrowest part of the neck, as small as 20 microns in diameter, while the thickest part of the body measured up to 43 microns in diameter. The colonies grew to a diameter of 10 cm. and were free-floating or on the bottom of the pool, depending on oxygen production. As we are unable to determine the *Ophyrdium* down to species, figures are appended for future reference.



UNIDENTIFIED OPHRYDIUM

Specimens numbered *Habeeb* 10585 and 10743 are deposited in the Cryptogamic Herbarium, Chicago Natural History Museum and in the collections of Herbert Habeeb. The Cryptogamic Herbarium, Chicago Natural History Museum, will distribute the duplicates.

It may be of interest to note that *Zoochlorella parasitica* has been reported from southern Quebec by C. W. Lowe in the Proceedings and Transactions of the Royal Society of Canada. III, 31 (sV): 291–316. 1927. Dr. Francis Drouet informed us that there are specimens labelled *Z. parasitica* in the Cryptogamic Herbarium, Chicago Natural History Museum, from our general vicinity. MAINE: edge of Wood's Pond, vicinity of Blue Hill, Hancock Co., *Wm. R. Maxon* 11235, 25 Aug. 1946. QUEBEC: small woodland pond, west branch of Mont Louis River, *M. L. Fernald, C. W. Dodge,* and *L. B. Smith* 2250, 30 July 1923.

GRAND FALLS, NEW BRUNSWICK.

AN ABBREVIATED FLORA OF MAINE.—The Josselyn Botanical Society of Maine has just issued a very handy Check-list of the Vascular Plants of Maine[1]. "Responsibility for the groups included are: Steinmetz for the grasses and sedges, Hyland for the woody plants, Edith B. Ogden for the ferns, and Ogden for the other groups." Such a division of responsibility leads, naturally, to different standards and divergent treatments. What some would call distinct others, with different outlook, will not; groups which some admit others, in parallel cases, exclude. For instance, "Plants now

[1] E. C. OGDEN, STEINMETZ, F. H. AND HYLAND, F. Check-list of the Vascular Plants of Maine. Josselyn Bot. Soc. Me., Bull. no. 8. 70 pp., Orono, Me., August, 1948. To be obtained for 50c from DR. F. H. STEINMETZ, Coburn Hall, Univ. of Me., Orono, Maine.

considered to be a part of our flora, whether native or naturalized, are indicated by plus (+) signs in the column for each county where found. Those plants growing on wool-waste, ballast, abandoned gardens, and other habitats where they may not yet be part of our flora but show indications of becoming so are indicated by minus (−) signs." That is well as a principle; but, having spent all or parts of his summers botanizing in Maine for at least 30 years, the present writer finds, unfortunately, that it cannot be applied without pretty full understanding, which here seems sometimes not complete. The entries in the Check-list total 2702, but, somewhat surprisingly, this total includes the PLANTED TREES, such as *Gingko biloba*, *Abies concolor*, *Pinus Mugo*, *Sciadopitys verticillata*, *Gymnocladus dioica*, etc., etc. To most people foreign plants purposely planted and not usually spreading into the wild would seem out of place in what the first line of the Foreword calls the "native and adventive" plants of the state. If the planted trees belong in such a list, surely planted *Philadelphus*, *Weigelia* and other popular shrubs of the garden-border, the scores and scores of hardy perennials (*Crocus*, *Delphinium*, *Paeonia*, *Digitalis*, etc.) and the "short and simple annuals of the poor" (*China-Aster*, *Cosmos*, *Eschscholzia*, etc.) should not be excluded.

The attempt in a brief summary in columns for the 16 counties to say what is "a part of our flora", what merely casual on "wool-waste", etc., while in the main logical, in practice often leads to some disappointments. Thus *Cynoglossum boreale* is entered as a species which "may not yet be part of our flora". It is, however, a woodland type, occurring in Canadian forest across the continent. The labels of specimens in the Gray Herbarium and that of the New England Botanical Club, from Maine and adjacent regions, which indicate habitats, read as follows: sandy alluvial woods, beneath larches (TYPE); coniferous woods; alluvial soil (Fort Kent); roadside (Houlton); woods (Orono); open woods, sandy soil (South Chesterville); dry soil on an esker (Chesterville); gravelly soil (Chesterville Ridge); woods; rich woods. Again, the very definite *Populus tremuloides*, var. *magnifica*, with so many characters that it surprises one that someone has not called it a species, is entered in this category of doubtfully established plants. Try to uproot it! When the present writer first met it, as an extensive grove of the largest trees he had ever seen of *P. tremuloides*, on the north bank of the Aroostook River, he made special notes on its unusual bark, branchlets, etc., as something noteworthy. In fact, all the labels of Maine material in the two herbaria before him indicate the collectors' belief that the tree is both indigenous and firmly established: river-bank (Fort Fairfield); river-bank (Orono); open woods and fields (Deer Isle); mixed woods (Lincolnville); shore and roadside (Isle au Haut—many sheets from several stations collected as something noteworthy); wooded river-bank (Bowdoinham). The firm status in the flora of *Bromus Kalmii* and *Triplasis purpurea* is doubted, although both of them have been collected in their typical habitats at one or more stations which connect very closely with their more extensive areas farther west or south. The habitats of the *Bromus*, as given on the labels, are "sandy woods, Oxford" and "Sand-plain, Newfield", such statements of habitat coinciding with those of specimens from New Hampshire and other parts of interior New England: "sandy wooded terrace", "rocky woods", "dry, thin woods", "dry rocks", "sand-plain" "dry soil of thicket", etc. Similarly, *Triplasis*, characteristic of coastal sands and abundant wherever found from the South to southern Maine, was collected by the late Walter Deane, "prostrate in sand, 4½ feet in diam.", at York Harbor. A few miles away, at Rye, Little Harbor (repeatedly collected), thence via Salisbury Beach and Ipswich, it abounds on maritime sands to all points south. Why are not these two native species reaching their natural eastern or northern limits in southwestern Maine, just as do scores of other plants?

While on this slippery subject of deciding what is really a part of the flora, what perhaps not, we may check some plants which are admitted without question to the dignity of a + sign. Most so dignified plants are unques-

tioned; but the plus-sign for such species as *Deschampsia elongata, Chenopodium graveolens* and *Collomia linearis* might, by those who know their broad natural ranges, be seriously questioned. The *Deschampsia* is native from the Rocky Mts. westward; the *Chenopodium* of the southwestern United States, Mexico and South America; the *Collomia* of the Gaspé region and western North America. It is, then, quite as one would expect to find that the + for *Deschampsia elongata* is based on a collection made by Parlin in 1896 and labeled "wool-waste, local, North Berwick"; *Chenopodium graveolens* marked "North Berwick, Sept., 1903"; and *Collomia linearis* from "ballast", Presque Isle, and from "wool-waste" and from "old field: plant probably originating from wool-waste", North Berwick. Surely if any species qualify as "growing on wool-waste, ballast" and meriting the "minus (−) sign" these seem perfect cases.

Incidentally, one notices, just before *Triplasis*, the entry, under *Tragus, T. racemosus* from York County. The very trifling representation of the genus in the state could have been doubled. One year Parlin got *T. racemosus;* another year, *T. Berteronianus* Schultes, also from "around wool-waste" at North Berwick.

In fact, in spite of the evident effort to see and check everything, to the point that names published in RHODORA as late as August 16, 1948, won their places, further search in RHODORA and elsewhere will reveal many additions to the Check-list. These need not here be recorded but memoranda will be supplied to the authors, who ask for such coöperation. On the other hand, some entries may need dropping or alteration. There are about 50 of these which, it is hoped, will be reconsidered before the publication of the projected state-flora. Four cases will make clear such need.

OPHIOGLOSSUM VULGATUM. The plant of acid to mediacid peat or wet sand in Maine is var. *pseudopodum* (Blake) Farwell, discussed in detail and illustrated in RHODORA, xli. 495 et seq., pl. 572 (1939). This eastern North American var. *pseudopodum* is very unlike the true Eurasian plant (see discussion, l. c. and plate 571). If it is felt that no recognition of geographic varieties in this semicosmopolitan species should be made (following the belief of Clausen, rather than that of Nuttall, Gray, Beck, E. G. Britton, Christensen, Clute, Hultén and others), then the varieties and forms of *Botrychium, Athyrium* and other wide-ranging and variable species should be omitted.

PUCCINELLIA PUMILA (Vasey) Hitchc. In RHODORA, xxxvi, 346–348 (1934), it was shown that this combination rests upon a wholly inadequate basis. The plant of the Maine coast is *P. paupercula* (Holm) Fern. & Weath., var. *alaskana* (Scribn. & Merr.) Fern. & Weath.

SALIX PETIOLARIS Sm. In RHODORA, xlviii. 47, 48 (1946), it was shown that, following Pursh (a notorious drunkard who made scores of confusions), American botanists have been misapplying this name. Smith's species (or hybrid) was a tree or coarse shrub of Europe, well illustrated by him and others of his time, which has nothing to do with our slender shrub, *S. gracilis* Anders. The facts that Pursh blundered and that some present-day students put greater emphasis on what they erroneously learned than upon careful typification of names do not alter the fundamental points.

POLEMONIUM VAN-BRUNTIAE Britton. The record entered is for Knox County. In the herbarium of the New England Botanical Club there is a thoroughly characteristic specimen from Matinicus, Knox County, collected by the late C. A. E. Long, of old-fashioned Jacob's-ladder, correctly identified as the European *P. caeruleum* L. and labelled "spreading in old cemetery". Was this the basis of the record? The very different *P. Van-Bruntiae* is a localized native in bogs, wet woods and mountain-ravines from Vermont and New York to Maryland and West Virginia.

These four cases out of twelve times as many indicate that there is yet a great deal of work to be done in rechecking many entries. It is also evident

that in this, as in all other state-lists, it is important that the authors understand the broad natural ranges of the species which extend into the local area from north, south, east or west. Without the broad natural ranges in mind the local occurrence of less usual plants is likely to be misinterpreted. Cases of this kind have been noted. Another, which perhaps needs investigation, is that of *Sisyrinchium albidum*, entered with a plus-sign. The natural range of the species is from Georgia to Louisiana, north to North Carolina, southern Ontario, Ohio, southern Michigan, southern Wisconsin and Missouri; but in 1898 the late Kate Furbish picked a flowering tip of it on Drake's Island in Wells. Is it truly a fixed element in our flora or a casual adventive?

The authors of the projected Flora have undertaken a man-sized task, for the reconciliation of divergent views and the deduction from them of satisfactory solutions requires close study of many contradictory treatments and fully authentic specimens. Perhaps the use of only two signs (+ and −) to cover many different categories is not enough. In any state we have the abundant and dominating natives (*Lycopodium clavatum, Abies balsamea, Calamagrostis canadensis, Nymphaea odorata*, etc.); indigenous but localized species (*Botrychium Lunaria, Potamogeton confervoides, Agropyron pungens, Pedicularis Furbishiae*, etc.); other indigenous plants not clearly established or but once found and now unknown (*Carex rariflora*, collected by Goodale on Mt. Katahdin in 1862 and *Anemone parviflora*, recorded in 1862 by Goodale from Fort Kent but apparently not seen there by others—presumably a *lapsus* for *A. multifida*); intentionally introduced plants which are now well naturalized (*Arrhenatherum elatius, Trifolium pratense, Pastinaca sativa*); intentional introductions as yet but slightly naturalized (*Echinochloa frumentacea, Setaria italica, Dianthus plumarius*); garden-plants spreading out of bounds (*Iris pumila, Dianthus barbatus, Sempervivum tectorum*); purposely introduced plants only casual and not persisting in the wild (*Zea Mays, Solanum tuberosum*); adventive or foreign plants arriving without man's wish but thoroughly naturalized (*Digitaria sanguinalis, Rumex Acetosella, Chenopodium album*); similarly adventive but only slightly naturalized (*Hibiscus Trionum, Abutilon Theophrasti*); viatical adventives, travelling largely along railroads and highways (*Eragrostis multicaulis* Steud. = *E. peregrina* Wieg., *Erysimum inconspicuum, Lepidium ruderale, Linum usitatissimum*); adventive but mostly casual, soon vanishing weeds of wool-waste (*Bouteloua gracilis, Cenchrus longispinus, Medicago laciniata, Erodium moschatum, Artemisia ludoviciana* var. *Brittonii* and an endless stream of others).

In view of the very many groups, as to their status in the region into which a local flora naturally divides itself, would it not be well to recognize at least some of these groupings (and perhaps others)? As the new Check-list now stands there is no indication as to whether the plants are native, intentionally introduced or adventive. The emblematic tree of Maine, *Pinus Strobus*, has the same sign as the most pestiferous of adventive weeds, like *Rumex Acetosella* or *Hieracium aurantiacum;* the beautiful and relatively rare native *Cynoglossum boreale*, the "fossil species", *Gingko biloba*, planted in a few dooryards, species of *Madia* coming up in someone's hen-yard from imported henfeed, and the miserable *Cenchrus pauciflorus*, sprouting from burs clipped out of wool imported from Mexico or our Southwest, all have their status indicated by the same minus-sign. Surely some more realistic method of classifying the floristic elements would be useful.

These critical memoranda are made in the utmost friendliness. The present writer, born and brought up in Maine and for many years returning there, is, perhaps, so fond of the "State of Maine" and its flora as to be a bit disturbed when a publication upon them, which has been prepared with much evident close work, shows at many points neglect or oversight of many details which would have made it wholly authoritative. The projected Flora, we may be sure, will eliminate such questionable points.—M. L. F.

JUNCUS GREENEI AND RHUS GLABRA IN QUEBEC

Marcel Raymond

Juncus Greenei Oakes & Tuckerman was found for the first time in Quebec, at Cap-de-la-Madeleine (St.-Maurice Co.), on August 20, 1947, during the foray of the Torrey Botanical Club. The rush grew in dense formations in a clearing, in a *Pinus Banksiana* barren.

Its rigid habit and its brown calyx give it a rather unusual aspect to one familiar with Quebec Junci. The distribution, as stated in *Gray's Manual* (7th ed., 1908): "sandy or barren soil, Me. to Vt. and N. J.; locally about the Great Lakes", tends to stamp it as a southern species which one would not expect to find as far north as reported herein. A specimen was sent to Professor M. L. Fernald, who has been kind enough to communicate the following note and observations: "Thank you for this fine sheet of *Juncus Greenei.* It is the first we have had from Quebec and a great extension northward in this longitude. Although abundant on sterile sands, acidic rock and worn-out soils near the coast of New Jersey, Long Island and New England, the species reaches the sand-dunes of southwestern Nova Scotia at the northeast. In western Maine and in the White Mts. of New Hampshire, it ascends to bare granitic summits and slopes up to 3800 feet. It avoids the largely calcareous Green Mts. of Vermont but swings north to the southern and western borders of the Adirondack area of New York. Farther west it reappears on the north shore (Algoma Distr.) of Lake Huron, thence west into Minnesota, going south to sands along the Great Lakes, etc. in Ohio, Michigan, Indiana and Illinois. Your new station in St.-Maurice Co. suggests that it will turn up in more siliceous areas between there and Algoma". (M. L. Fernald, in litt. Feb. 24, 1948).

A careful revision of the material collected in the Ottawa river valley and labelled *Juncus tenuis* Willd. or *J. macer* S. F. Gray has so far proved fruitless. However, botanists in the Ottawa district should be on the lookout for this interesting species.

Actually, the region around Lake St. Peter, with its lengthy stretches of sand, serves as the northernmost limit for many

southern elements, i. e.: *Aster linariifolius* L. var. *Victorinii* Fern., *Carex Merritt-Fernaldii* Mack., *C. Muhlenbergii* Schk., *Comandra umbellata* (L.) Nutt., *Convolvulus spithamaeus* L., *Cyperus filiculmis* Vahl var. *macilentus* Fern., *Lechea intermedia* Leggett var. *laurentiana* Hodgdon, *Lilium philadelphicum* L., *Prunus susquehanae* Willd., to which list one should now add *Juncus Greenei* Oakes & Tuckerman.

Rhus glabra L. has been searched for in Quebec for a long time, and was at last found, in August 1947, in Farnham, Missisquoi Co. It grew on a sand-ridge close to a large bog remarkable for its rich flora: *Habenaria blephariglottis* (Willd.) Torr., *Linaria canadensis* (L.) Dumont, *Ophioglossum vulgatum* L. var. *pseudopodum* (Blake) Farwell, *Utricularia geminiscapa* Benj., *Woodwardia virginica* (L.) J. E. Smith.

A party consisting of Messrs. Albert Courtemanche and Aubert Hamel, of the Service de Biogéographie de l'Université de Montréal, and the author of this note, assisted Dr. J. E. Potzger of Butler University in the transportation of boring-equipment during his survey of the bogs of the province of Quebec. At Farnham, looking for a suitable path through which to cart the cumbersome instruments through the bog, two members of the group were stranded and sheepishly returned with the woeful tale that they had inadvertently walked through *Rhus Vernix* L.

Poison Sumach, however, is very rare in Quebec. It is known only from East (?) Templeton, in the Ottawa Valley, Laprairie, in the vicinity of Montreal, Ste. Victoire (Richelieu Co.) and St. Chrysostome (Huntingdon Co.).

After a careful search the author located about a hundred individuals of the harmless *Rhus glabra* L., the species itself a brand new addition to the flora of Quebec. As *Rhus typhina* L. surrounds the stand, the hybrid (× *R. hybrida* Rehder) may well turn up eventually.

The author wishes to thank Prof. M. L. Fernald for permission to use the phytogeographical indications he has given in his letter and to James Kucyniak, of the Montreal Botanical Garden, for his kind assistance with the drafting of this note.

Montreal Botanical Garden.

Salicornia europaea in Illinois.—After checking several sources of information it appears that *Salicornia europaea* L. had not been found in Illinois until last year. This plant of saline soil was collected by the writer in Cook County, Illinois, on September 2, 1948, and from the same locality again two weeks later. The specimens were collected in an area approximately one hundred feet by ten feet. Seven plants were observed in a casual inspection. The habitat of the plant is as follows: a muddy flat, frequently inundated, along the bank of the Little Calumet River at a point about 1200 feet west and 25 feet south of northeast corner of Section 8, T 36 N, R 14 E. This location is just north of the town of Harvey and about one quarter mile west of Halsted Street. This species of *Salicornia* has been attributed to Wisconsin,[1] but this is the first known collection in Illinois.

Since waterways connect Lake Michigan with Atlantic coastal waters and those of the Mississippi River and the Gulf of Mexico, it seems likely that this plant is a recent introduction to our area. It is hardly possible that *S. europaea* L. is to be considered a relict as are some of the plants of the Great Lakes area. Hence the idea of introduction is a more plausible explanation of the occurrence of this plant in northern Illinois.

Chemical analysis, by O. W. Vogel of the Illinois State Water Survey Division, revealed that water saturating the soil has about ten times the normal mineral content of ordinary ground water in that area. Since the mineral content of this water is also many times that of Lake Michigan it is possible that the supply of chlorides and sulphates comes from some industrial source. Dr. L. T. Kurtz analyzed a soil sample and reported the pH to be 7.5.

Some other plants associated with the Illinois locality of *Salicornia* are: *Echinochloa crusgalli* (L.) Beauv., *E. walteri* (Pursh) Heller, *Eragrostis hypnoides* (Lam.) BSP. *Heleochloa schoenoides* (L.) Host, *Atriplex hastata* L., and *Cyperus erythrorhizos* Muhl.

Specimens have been deposited in the Herbarium of University of Illinois (No. 1588, 1599), as well as the Chicago Museum of Natural History (1588) and Gray Herbarium (1588).

[1] W. C. Muenscher, Aquatic Plants of the United States, p. 219 (1944).

Verification of identity of specimens has been made by Professor G. Neville Jones and Dr. J. A. Steyermark.—Glen S. Winterringer, Department of Botany, University of Illinois.

Notes on four Virginia Plants.—In one of the many narrow valleys of the Massanutten Mountain area in northern Virginia lies a small, but botanically interesting, bog.

The valley, varying in altitude from one thousand to twelve hundred feet, is flanked on either side by quartzite ridges and has been carved out by the wearing away of the less resistant shales and limestones that comprise the valley floor. These latter rocks supply the needs of lime-loving plants, while disintegrating sandstone, together with humus, meets the needs of the acid-loving ones.

The bog, lying within this valley, has an elevation of about one thousand feet. Its varied and interesting flora consists of trees, shrubs, and herbaceous plants.

Of the trees, *Fraxinus nigra* Marsh. is probably the one of greatest interest in this area. This northern species of Ash, as far as it is known, reaches its southern limit in Summers County, West Virginia. As far as I know, the station given in this paper is the only known one for this species in Virginia. There are twenty-three or more trees of *Fraxinus nigra* within and on the borders of the bog. Clustered close about the base of one, which grows well within the bog, is a clump of *Cypripedium reginae* Walt., part of a small group of some forty-seven plants of this *Cypripedium* found in this locality, which, in turn, is one of the four known stations in Virginia for this northern orchid. All four of the stations are in the Massanutten area, two in Rockingham County, Virginia, two in Shenandoah County, Virginia.

Near the border of the bog a Black Ash shelters a group of twelve or more plants of *Liparis Loeslii* (L.) Richard, another northern orchid, this one very near the southern limits of its range.

A fourth plant of interest in this, as yet, incompletely explored bog, is *Utricularia gibba* L., a plant more commonly found inhabiting Coastal Plain areas. To C. O. Handley, Jr., of V. P. I., belongs the credit for having first found this *Utricularia* in this area.—Lena Artz, Waterlick, Virginia.

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CONTENTS:

Monographic Studies on the Characeae. I. Emendation of Nitella Morongii. *R. D. Wood.* 13

Some Results of a Summer's Botanizing in Oklahoma. *U. T. Waterfall.* 18

Polyploidy in Passiflora lutea. *J. T. Baldwin, Jr.* 29

Does Dicranum arcticum occur in southern central Quebec? *James Kucyniak.* 29

Dicentra Cucullaria f. purpuritincta in Quebec. *Marcel Raymond.* 30

A most useful Series of Illustrations (Review). *M. L. F.* 31

Ophrydium; a Correction. *Eds.* 32

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Photo. E. A. Robinson

NITELLA MORONGII Allen, emend. Fig. 1, compact form, LECTOTYPE of *N. Morongii* Allen, × 1.2; fig. 2, typical form, *E. T. Moul*, no. 3173 (RDW), × 0.7; fig. 3, typical form, TYPE of *N. maxceana* Allen, × 0.9.

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MONOGRAPHIC STUDIES ON THE CHARACEAE. I. EMENDATION OF NITELLA MORONGII

R. D. Wood

(Plate 1119)

T. F. Allen (Bull. Torrey Bot. Cl. **14:** 214. 1887) described a new species of Characeae, *Nitella Morongii* Allen, based on a collection cited as ". . . gathered by the Rev. Thos. Morong, on the Island of Nantucket, in a very muddy pool, July 21st, 1887." He later (The Characeae of America, part **2**, fasc. 2: pl. 16. 1894. New York) illustrated the new species. Since Allen's death in 1902, this species has caused certain taxonomic difficulties. Through the cooperation of M. S. Doty, the writer has had the opportunity to study a series of specimens from the Woods Hole region, and feels obligated to attempt to clarify the apparent facts about the species and summarize the information.

The collection made by Rev. Thomas Morong includes a series of possibly fifty specimens. This series is quite consistent, and duplicates which have been issued to various herbaria (including MISS, MIN, UC, FH)[1] are very good. The majority of specimens are fertile and mature, and exhibit about the same gross appearance. Among the specimens seen by the writer, none has been specified as the type. Further, the writer has been unable to discover the specimen from which the published drawing was

[1] Abbreviations of herbarium names follow Lanjouw, Chron. Bot. 5: 142–50. 1939, with the exceptions of the private herbaria of W. R. Taylor (WRT), M. S. Doty (MSD), E. T. Moul (ETM), the writer's herbarium (RDW), and the herbarium of the Marine Biological Laboratory, Woods Hole, Mass. (MBL).

made; but a photograph of *N. Morongii* apparently by T. F. Allen is extant in the herbarium of the New York Botanical Garden, accompanied by its original specimen. For this reason, the writer has selected this specimen as the type, and has designated the specimen as follows: "TYPE (lectotype), *Thomas Morong* no. 4, July 21, 1887. In a very muddy pool on the roadside, near Siasconset, Nantucket" (NY) (FIG. 1).

During July, 1947, the writer visited Nantucket, and sought the type locality of this species. Opposite Bloomingdale on the Siasconset Road are no small pools. On this, the east side, was a small *Sphagnum* bog completely covered by a mat; and somewhat farther south was an extensive *Typha* swamp. On the west side of the road was a cattle hole. None of these fit the description of the type locality, and it is concluded that the original pool no longer exists. A thorough search of the existing possible sites turned up no Characeae. Miss Grace Wyatt of the Maria Mitchell Association of Nantucket graciously guided the writer to other likely stations, but without success. No specimens comparable to Morong's plant have been reported since 1887, as far as is known to the writer.

A letter from Morong to Allen concerning his collection is extant in the herbarium of the New York Botanical Garden. The information is as amusing as it is pertinent: "No. 4. The nearest I can come to this is Nitella gracilis, possibly the large, diffuse form which Halstead [Halsted] says on authority of Farlow grows in Nobska Pond, at Woods Holl; but is it not extraordinarily heavy and stout for N. gracilis? If it were not of this order, no one would think of putting such forms together, but you do strange things with Chara— as for instance C. intermedia and C. intermedia var. americana are about as much alike in size as a walnut and a morning glory . . . " Halsted (Proc. Bost. Soc. Nat. Hist. **20:** 176. 1879) published the record of *N. gracilis* Ag. from Nobska Pond. Halsted's specimen is extant in the Farlow Herbarium. The "authority" mentioned was apparently W. A. Setchell or F. S. Collins; but in either case the specimens were distributed as *N. gracilis* f. *brachyphylla* under No. 1195 in the Phycotheca Boreali-Americana. The humor attests to slightly acid opinions by Allen's contemporary bot-

anists. Halsted's plants take on a greater significance as expanded later.

Prior to Morong's type collection, L. L. Dame had collected the same species in the same locality in 1886. The specimens are extant in the New York Botanical Garden, and have been distributed to other herbaria (including UC, F, FH, MISS). Concerning this collection, the label on the specimen (now in herb. NY) from F. S. Collins' herbarium is annotated: "This specimen apparently the first ever found of this species; it remained undetermined until 1887, when Mr. Morong found, at the same place, a Nitella which Dr. Allen named as above [*N. Morongii* Allen]." A comparison of Dame's and Morong's plants shows a decided difference in appearance, but almost complete identity of fundamental features. Dame's plants are densely bushy with well-formed heads about 5–10 mm. in diameter, and regular sterile branchlet whorls similar to *N. gracilis* (Sm.) Ag. On the other hand, Morong's plants have very small fertile heads 2–3 mm. in diameter, and very poorly developed sterile branchlet whorls. A possible explanation for this divergent expression might be suggested by his notes (in herb. NY) as follows: "The pool is one which does not dry up in the summer time, I am told; and is used by horses on the road as a drinking place. Hence, this little plant is constantly trampled by the feet of animals in the mire. It is a wonder how it lives with such usage, and in such dirty water." The present writer is of the opinion that a possible reason that this form has never again been collected is that Morong's plants exhibit a unique physiological expression which resulted from this peculiar combination of adverse circumstances impinging upon the plants in that pool at that season of that year.

A third type of plant which closely resembles Morong's collection is Halsted's *N. gracilis* mentioned above. As stated in Morong's letter to Allen, this plant is relatively large and quite diffuse. It also has characteristic condensed fertile heads and diffuse sterile whorls. Fundamentally, it differs from Dame's collection of 1886 only in being more diffuse. In all ascertainable respects, such as oospore membrane, oospore dimensions, furcation of branchlets, structure of dactyls and mucros, it is identical. Halsted's plant, then, is apparently a more diffuse ecological

expression of *N. Morongii*. This same form has been repeatedly collected at Woods Hole during the last fifty years, and is quite stable in its characteristics. It has been collected from Nobska Pond, Golf Pond, and Harper Pond, where it was found during the summer of 1947 by E. T. Moul (FIG. 2).

A fourth plant extant in the New York Botanical Garden is contained in the species-cover for *N. maxceana*. T. F. Allen had a difficult time indeed with this plant. It was at first identified as *N. batrachosperma* (Reich.) Braun, as indicated by written data on the herbarium sheet. It was reported as such by Maria Owen (Plants of Nantucket, p. 74. 1888. Northampton) as the first record of this species for America. Allen (The Characeae of America, part **2**, fasc. 3: 27. 1896. New York) hesitatingly offered a tentative description of this plant under the name *N. maxceana* Allen, as possibly distinct from *N. minuta* Allen and *N. batrachosperma*. The name of his new species, with description accompanied by a specimen, was validly published, as recently pointed out by the present writer (Farlowia **3**: 379. 1948). The only known existing specimen is hereby designated as the type and so indicated on the label accompanying the specimen: "TYPE: July 7, 1887, *Morong*. Maxey's Pond, Nantucket, Mass." (NY) (FIG. 3). On comparison with Halsted's plant or with the so-called *N. gracilis* of the Phycotheca Boreali-Americana, one finds *N. maxceana* Allen to be identical with the *N. gracilis* of Halsted and F. S. Collins.

A fifth plant extant in the New York Botanical Garden, where it had remained among the indeterminatae previous to the present study, is accompanied by the data: "Nitella, Woods Holl, Mass. 1883." This plant is almost a perfect intermediate between *N. maxceana* and *N. Morongii*, and helps close the gap between the two supposed species.

The conclusion which apparently must be made is that all the plants mentioned represent merely expressions of *N. Morongii*, and that the "typical" *N. Morongii* is in reality a very extreme abnormality; and *N. gracilis* according to Halsted and *N. maxceana* Allen are the normal form of the species. The description for this species thus requires emendation, and a revision is given below.

NITELLA MORONGII Allen, emended (FIG. 2). Plant monoe-

cious, up to 20 cm. high, delicate: branchlets of two types, including the normally expanded sterile or weakly fertile branchlets, and the greatly reduced sterile branchlets: sterile branchlets 2–5 (–8) in a whorl, 15–26 mm. long, 1–2 times furcate into 3–5 secondary rays, 2–3 tertiary rays: dactyls of sterile branchlets 2–3, 2-celled, the ultimate cell a conical mucro which is early deciduous: fertile branchlets 6–7 in a whorl, twice furcate, greatly reduced, 1–3 (–8) mm. long; 3–5 (–12) such reduced whorls borne on a reduced branch, the entire fertile complex resembling a dense head (or spike); heads appearing axillary in sterile whorls, or terminal, enveloped in weak mucus: dactyls of fertile branchlets 2 (–3), 2-celled, of which one is commonly shorter than the other, terminated by an elongated mucro: gametangia solitary, an oogonium and an antheridium at each fertile branchlet node: oogonia 290–386 μ long by 210–288 μ broad; coronula 35 x 35 μ; oospores 238–268 μ long by 180–210 μ broad; striae of 5 prominent ridges; membrane roughened with anastomosing lines, almost appearing finely reticulate or grumous: antheridia 134–148 μ long by 174–179 μ broad, short-stipitate.—Bull. Torrey Bot. Cl. **14:** 214. 1887, descr.; *N. maxceana* Allen, Char. Amer., part **2**, fasc. 3: 27. 1896; *N. gracilis* (Sm.) Ag., accord. to Halsted, Proc. Bost. Soc. Nat. Hist. **20:** 176. 1879; *N. gracilis* f. *brachyphylla*, accord. to F. S. Collins, in Phyc. B.-A., fasc. xxiv, no. 1195; *N. batrachosperma* (Reich.) Braun, accord. to Allen in Maria Owen, Pl. Nantucket, p. 74. 1888.—MASSACHUSETTS: NANTUCKET CO.: Maxey's Pond, July 7, 1887, *T. Morong* (NY) (TYPE of *N. maxceana*, in New York Bot. Gard.); Siasconset, in a small pond on the south side of Sconset Road opposite "Bloomingdale," July, 1886, *L. L. Dame* (NY, in one P. B.-A. packet, no. 1382); in a very muddy pool on the roadside near Siasconset, July 21, 1887, *T. Morong* (LECTOTYPE in New York Bot. Gard.); ibid., Aug. 23, 1896, *F. S. Collins* (P. B.-A., no. 1382, NY, BRU). DUKES CO.: Naushon Island, Petchett Pond, July 5, 1946, *Hannah Croasdale* (MBL). BARNSTABLE CO.: Golf Pond, July, 1931, *G. M. Gray* (WRT); July 6, 1917, *W. R. Taylor* (WRT); June 24, 1935, *Hannah Croasdale* (WRT); Harper Pond, July 7, 1947, *E. T. Moul*, no. 3173 (ETM, NY, RDW); July 11, 1947, *Urda K. Wood* (NY, RDW); Nobska Pond, July 15, 1894, *W. A. Setchell* and *W. J. V. Osterhout*, no. 644 (FH, MBL, NY, UC); July 15, 1894, *W. A. Setchell* (P. B.-A., no. 1195); Woods Hole, [locality not given] 1883, [coll.?] (NY); *Halsted* (FH) as *N. gracilis.*

Two markedly different forms are recognized as ecological variants: (1) compact form, with heads greatly reduced, 2–5 mm. in diameter, 5–12 fertile whorls on a fertile branch forming a spike-like head (July 21, 1887, *T. Morong* (NY)); and (2) diffuse

form, with heads 5–12 mm. in diameter, 2–4 fertile whorls on a fertile branch, forming a more or less spherical head (July 7, 1887, *T. Morong* (NY)).

Zaneveld (Blumea **4:** 70. 1940) states that in his opinion *N. Morongii* Allen should be united with *N. translucens* Pers., but the present writer has been unable to discover much in common between the two species. A final decision on relationships must await further investigation.

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SOME RESULTS OF A SUMMER'S BOTANIZING IN OKLAHOMA

U. T. Waterfall[1]

During June and July, 1947, the author participated in a project of the Oklahoma Biological Survey which included (1) a study of the floristic composition and ecology of relict Oklahoma grassland sites, and (2) a study of the flora and phytogeography of the state as a whole.

The part of the work first mentioned is being accomplished by studying grassland sites situated throughout the state. Areas were selected which will give a fairly accurate picture of the composition of, and seasonal succession on, the original prairies and plains of our state. In general two kinds of sites have been chosen: (1) meadows, consisting of unplowed prairies which have been saved for hay production, and (2) miscellaneous small areas which have escaped plowing or grazing due to their relative inaccessibility and size (such as small sites surrounded by rocky outcrops, or certain areas in railroad-right-of-ways). The former will not give an altogether true picture of the situation since mowing, too, is selective. It is thought, however, that study of relicts of all kinds will yield results of some value. They will be discussed in a later paper.

The present paper deals primarily with distributional notes concerning species rarely collected in the state, and species

[1] Botanist, Oklahoma Biological Survey.

newly recorded from Oklahoma. The latter are prefixed with an asterisk in the following account.

One of the most interesting and productive regions botanized was the Black Mesa area in western Cimarron County in the western end of the Oklahoma Panhandle. From it have been taken almost a third of the additions to the Oklahoma flora hereinafter recorded. It constitutes a distinct phytogeographic province, called the Mesa de Maya region by Blair and Hubbell.[1] According to Duck and Fletcher[2] 363 square miles of Oklahoma are included in this area, which they call the pinyon-juniper-mesa game type. It is a part of a mesa region extending into our state from northeastern New Mexico and southeastern Colorado. The most distinctive geographic feature of the area is the Black Mesa itself, a sandstone, basalt-capped mesa with an elevation of almost 5,000 feet, rising 500–700 feet above the surrounding terrain.[3] It is the highest point in Oklahoma.

Many of the floral affinities appear to be southwestern as will be evidenced by the enumeration which follows later. The valleys between the mesas are covered with grass and are often characterized by *Opuntia arborescens.* The principle species of the grassland, when not overgrazed, are *Hilaria Jamesii* and *Bouteloua gracilis,* with *Buchloe dactyloides, Bouteloua curtipendula* and *Sporobolus cryptandrus* forming conspicuous parts of the vegetation. Other grasses are: *Muhlenbergia Torreyi, Triodia pilosa, Andropogon saccharoides, Panicum obtusum* and *Sitanion Hystrix.* When overgrazed *Muhlenbergia Torreyi, Buchloe dactyloides* and *Triodia pilosa* become the common species. On sandy soils *Munroa squarrosa* is locally abundant, increasing under overgrazing.

The mesa slopes are often characterized by *Pinus cembroides* var. *edulis, Juniperus monosperma,* and, in some places, by a chaparral of *Quercus* spp., including *Q. grisea.* Other common species include *Rhus trilobata* var. *pilosissima* and *Cercocarpus montana.* Between rock ledges and arroyos on these slopes,

[1] Blair, W. F. and T. H. Hubbell. *The Biotic Districts of Oklahoma.* Am. Midl. Nat. **20**: 425–454. 1938.

[2] Duck, L. G. and Jack B. Fletcher. *A Survey of the Game and Furbearing Animals of Oklahoma.* State Bulletin No. 3: 42. Oklahoma Game and Fish Comm., Oklahoma City, Okla.

[3] Schoff, Stuart L. and J. Willis Stovall. *Geology and Ground Water Resources of Cimarron County, Oklahoma.* Okla. Geol. Surv. Bull. No. 64: 21 and 120. 1943.

where water and soil accumulate, there are found clumps of *Andropogon scoparius*, *Andropogon Gerardi*, *Sorghastrum nutans* and *Panicum virgatum*. These mesic species are not commonly found elsewhere in the surrounding terrain, hence their relict nature in this area is adduced. In these arroyos are also found, sometimes in abundance, *Rubus deliciosus*, *Ribes cereum* and a dwarfed form of *Prunus virginiana*, perhaps var. *melanocarpa*. On the adjacent slopes *Glossopetalon planitierum* often forms large matted clumps. Along an arroyo at the base of a xeric slope was found *Allionia incarnata*, an unexpected addition to the state flora. *Bromus anomalus* var. *lanatipes*, previously unknown from the state, is fairly common along the arroyos and at the bases of rock ledges. Other characteristic species found on the slopes include: *Aristida glauca*, *Bouteloua eriopoda*, *Lycurus phleoides*, *Panicum Hallii*, *Trichachne californica*, *Eriogonum tenellum*, *Eriogonum Jamesii*, *Atriplex canescens*, *Dalea formosa*, *Baccharis Wrightii*, *Pericome glandulosa* and *Stephanomeria pauciflora*. Near the base of the mesa were taken *Aristida divaricata* and *Mentzelia multiflora*, both seldom collected within the state. *Gilia laxiflora* is frequently found on the lower hills, ridges and plains throughout this area.

On the low ridges near the edges of the mesa country some of the characteristic species collected include: *Sitanion Hystrix*, *Eriogonum lachnogynum*, *Dalea Jamesii*, *Psoralea argyrophylla*, *Mentzelia multiflora*, *Oenothera lavandulaefolia*, *Gilia laxiflora*, *Cryptantha Jamesii* var. *multicaulis*, *Baccharis Wrightii*, *Senecio longilobus*, *Senecio tridenticulatus* and *Stephanomeria pauciflora*. On very shallow soil *Paronychia sessiliflora* is often abundant.

Contrasting vegetation types, and still good collecting grounds, are to be found in the extreme southeastern part of the state. For example, near Tom, in McCurtain County, in oak-pine (*Pinus Taeda*) the following species were among those taken: *Kyllinga brevifolia* (previously unreported from the state), *Gillenia stipulata*, *Rhexia mariana* var. *leiosperma*, *Ludwigia hirtella*, *Eryngium prostratum*, *Diodia virginiana* and *Vernonia texana* (new to our flora). In a near-by roadside ditch was found *Verbena bonariensis*, an adventive which has either recently spread into the state, or has been overlooked previously.

In the near-by cypress swamps (*Taxodium distichum*) were

found: *Polypodium polypodioides* (epiphytic), *Fimbristylis Vahlii, Sabal minor, Brunnichia cirrhosa, Cassia Tora, Rotala ramosior* var. *interior, Ludwigia glandulosa* var. *typica, Trepocarpus Aethusae, Asclepias variegata, Hydrolea ovata, Heliotropium indicum, Justicia lanceolata* and *Spermacoce glabra.*

Other contrasting regions will be dealt with in subsequent papers, and all will be treated more fully as more data become available.

There follows an annotated enumeration of some of the more interesting plants collected. It includes 29 additions to the state flora. All the specimens cited are in the Bebb Herbarium of the University of Oklahoma. Duplicates of most of them will be available for distribution to a few other herbaria at a later date.

Enumeration of Species

Ephedra antisyphilitica Berl. ex C. A. Meyer.

Cutler[1] cites only the following from Oklahoma: "Along the Red River, Harmon Co., Dec. 16, 1933, *Goodman* and *Barkley.*"

In our herbarium we have material from Beckham, Jackson, Harmon, Cotton and Greer Counties.

*Agropyron Smithii Rydb., var. molle (Scribn. and Smith) Jones. *Waterfall* 7511, sandstone slopes, 7 miles southeast of Kenton, Cimarron Co., July 9, 1947. Hitchcock[2] states that var. *molle* has "about the same range as the species." Of 22 sheets in our herbarium we have only the above representing var. *molle.* The others are representative of var. **typica,** nom. nov., *A. Smithii* Rydb., Mem. N. Y. Bot. Gar. **1:** 64. 1900, sens. strict.

*Bromus anomalus Rupr., var. lanatipes (Shear) Hitchc. The pubescent-sheathed variety of *B. anomalus* was collected as *Waterfall* 7465, in arroyos running up the northeast slope of Black Mesa, 4 mi. north of Kenton, Cimarron Co., July 9, 1947; and *Waterfall* 7506, sandstone slopes 7 miles southeast of Kenton, Cimarron Co., July 9, 1947.

Muhlenbergia arenicola Buckl. is fairly common in the Black Mesa area. Since it increases under conditions of overgrazing, its presence in abundance serves as an indicator of overgrazing in this region. A collection was made as *Waterfall* 7534.

*Stipa Scribneri Vasey. Apparently referable to this species is material collected as *Waterfall* 7493, mesa slopes 1 mile west and 1–2 miles WSW of Kenton, Cimarron Co., July 9, 1947.

[1] Cutler, Hugh Carson, *Monograph of the North American Species of the Genus Ephedra,* Ann. Mo. Bot. Gard. **26:** 415. 1939.

[2] Hitchcock, A. S. *Manual of the grasses of the United States.* USDA Misc. Publ. 200: 233. 1935.

According to Hitchcock[1] the species has been previously known from the adjoining states of Colorado and New Mexico. Of the five species of Stipa now known in Oklahoma (Featherly[2] has listed four) two, *S. neomexicana* and *S. Scribneri*, are known only from the Black Mesa area of Cimarron County. Since this constitutes a distinct phytogeographic province, similar to the regions from which the species were previously known, it is not startling that they are found here, but they are unlikely to be found much farther east within the state.

*Trichachne californica (Benth.) Chase was collected as *Waterfall* 7453, in an arroyo running up the northeast slope of the Black Mesa, 4 miles north of Kenton, Cimarron County, July 9, 1947. It is fairly common in this area. Hitchcock[3] states that the species ranges from Texas to Colorado, Arizona and Mexico. Featherly[4] lists only *Trichachne patens* from Oklahoma, stating that it is found in Greer County.

*Kyllinga brevifolia L. A collection taken as *Waterfall* 7593, in oak woods west of Tom, McCurtain County, July 18, 1947, is referred to this species since it has obovoid achenes, large scales which are scabrous-keeled, and is of perennial habit. The genus *Kyllinga* is not listed in Jeffs and Little's *checklist*[5]. Small in both his *Flora*[6] and *Manual*[7] gives the range of *K. brevifolia* in the United States as being Georgia to Florida and Texas.

*Kyllinga pumila Michx. was collected as *Goodman* and *Waterfall* 4546 along Little River, north of Broken Bow, McCurtain County. Britton and Brown[8] include "Kansas, Texas" in their range-statement. In checking our herbarium another sheet of this species was found; it is *Bebb* 6108, roadside ditch, Delaware Co., Oct. 7, 1940. Since it is not listed by Jeffs and Little (op. cit.) these collections definitely add the species to the state flora.

Scirpus koilolepis (Steud.) Gleason. [(*Scirpus carinatus* (H. and A.) Gray)]. In our herbarium there is only one sheet of this species from the state. It is *Little* 944, Muskogee Co., June 11, 1927. The author's summer collections provide two additional stations. They are No. 6882, edge of pond 8 miles east and 2½ miles south of Miami, Ottawa Co., June 6, 1947, and No. 7360,

[1] Hitchcock, A. S. *op. cit.* 434, 435.

[2] Featherly, H. I. *Manual of the Grasses of Oklahoma.* Bull. Okla. A. and M. Coll. v. 43 no. 21. 1946.

[3] Hitchcock, A. S. *op. cit.* 551.

[4] Featherly, H. I. *op. cit.* 93.

[5] Jeffs, R. E. and Elbert L. Little. *A Preliminary List of the Ferns and Seed Plants of Oklahoma.* Publ. of the Univ. of Okla. Biol. Surv. v. 2, no. 2. 1930.

[6] Small, J. K. *Flora of the Southeastern United States.* 174. 1903.

[7] Ibid, *Manual of the Southeastern Flora.* 155. 1933.

[8] Britton, Nathaniel Lord and Addison Brown. *Illustrated Flora.* 1: 296. 1936.

edge of pond among stabilized sand dunes, 20 miles west of Medford, Grant Co., July 7, 1947.

*Habenaria lacera (Michx.) R. Br. *Waterfall* 6945, climax prairie, 7.7 miles east of Locust Grove, Mayes Co., June 7, 1947 is referred to this species. No species of *Habenaria* is listed by Jeffs and Little (op. cit.). Stemen and Myers[1] list one species (as *Perularia flava*). The latter is the only species we have in our herbarium. Stevens[2] lists *H. ciliaris* in his Flora, but he only says that it "should be expected in . . . (the) . . . eastern part of the state." At present I do not know of this expectation having been realized. *Habenaria leucophaea* (Nutt.) Gray should be found within the state. Although we have no specimens in our herbarium, and the usual manual range-statements do not include our state, Nuttall[3] in describing *Orchis leucophaea* says "hab. in moist prairies near Kiamecha, Red River". If this statement means the confluence of the Kiamichi River with the Red River it would locate the collection in the southeastern part of the present state of Oklahoma.

*Quercus grisea Liebm. was collected as *Waterfall* 7498 and 7499 on mesa slopes 1 mile west and 1–2 mile WSW of Kenton, Cimarron Co., July 9, 1947. Here it was quite common. Associated with it were *Pinus cembroides* var. *edulis* and *Cercocarpus montanus*.

*Rumex pulcher L. The author's 7576 was taken from a disturbed prairie, 3 miles east of Ft. Towson, Choctaw Co., July 18, 1947. We also have: *Bebb* 4367, along roadside, Cookson Hills, Cherokee Co., June 10, 1939; *Demaree* 12609, moist places, Valiant, McCurtain Co., May 16, 1936; *Waterfall* 2100, along Kiamichi River, 8 miles east of Hugo, Choctaw Co., June 15, 1940.

*Suaeda suffrutescens S. Wats. This southwestern perennial *Suaeda* was collected from two widely separated saline sites in the western part of the state. The collections are the author's 7296, saline plain 4½ miles south of Hollister, Tillman Co., June 27, 1947, and No. 7544, saline-gypseous flats, 16 miles east of Orienta, Major Co., July 11, 1947.

*Allionia incarnata L. This southwestern species was an unexpected find on the Black Mesa. It was collected as *Waterfall* 7474, zeric NE slopes of Black Mesa, 4 miles north of Kenton, Cimarron Co., July 9, 1947. *Erigeron divergens* var. *cinereus* was so abundant that it gave the slopes a grayish-green color which

[1] Stemen, Thomas R. and W. Stanley Myers. *Oklahoma Flora.* 1937.

[2] Stevens, G. W. *The Flora of Oklahoma.* Unpublished MSS. Original deposited in the Widener Library of Harvard University, 1916.

[3] Nuttall, Thomas. *Collections toward a Flora of the Territory of Arkansas.* Transactions of the American Philosophical Society, vol. 5, n. s. 1837.

could be seen for a mile or more. Other associated species included *Eriogonum tenellum* and *Dalea formosa*.

*PARONYCHIA SESSILIFLORA Nutt. The author's 7500 from mesa slopes west of Kenton, Cimarron Co., is referred to this species. Although the species appears in Jeffs and Little (op. cit.) and Stemen and Myers (op. cit.) we have in our herbarium only one other sheet, *Barkley* 465, twenty miles west of Boise City, Cimarron Co., July 8, 1928. It was determined as *Leptodactylon caespitosum* Nutt., and in 1946 was referred to *Paronychia sessiliflora* by Goodman. Core[1] does not record it from Oklahoma. The species was fairly abundant where the author collected it.

LOEFLINGIA TEXANA Hook. The following collections are so referred: *Waterfall* 7115, sand dunes stabilized by *Artemisia filifolia* and *Plantago Purshii*, 5 miles north of Mooreland, Woodward Co., June 18, 1947; *Waterfall* 7279, sand dunes covered with *Artemisia filifolia* and *Aphanostephus skirrhobasis* on the north side of the Red River, 4 miles west and 4 south of Randlett, Cotton Co., June 27, 1947. Hopkins[2] has previously reported this plant from Harper County. Apparently it extends across the western part of the state in sand.

*DIANTHUS ARMERIA L. The following are referred to this species: *Hopkins* 3255, Dripping Springs, Delaware Co., May 7, 1938; *Waterfall* 7039, along creek 3 miles east and 2 north of Dripping Springs, Delaware Co., June 8, 1947.

*RIBES CEREUM Dougl. This Rocky Mountain *Ribes* was collected as *Waterfall* 7475, at base of escarpment just below the top of the northeast side of Black Mesa, 4 miles north of Kenton, Cimarron Co., July 9, 1947.

POTENTILLA RECTA L. This species, seldom collected in our state, was taken as *Waterfall* 6879, overgrazed pasture, 5½ miles east of Miami, Ottowa Co. It had increased under overgrazing.

RUBUS DELICIOSUS Torr. Although recorded by Jeffs and Little (op. cit.) the species is seldom collected in Oklahoma. We have no sheets in our herbarium. *Waterfall* 7469 was collected from the northeast slopes of Black Mesa, 4 miles north of Kenton and 7507 from sandstone slopes 7 miles southeast of Kenton, Cimarron Co., July 9, 1947.

*HOFFMANSEGGIA DREPANOCARPA Gray was collected as *Waterfall* 7505, mesa slopes, Cimarron Co., July 9, 1947. The collection is so referred because it has characteristic lunate pods and eglandular calyx lobes, pedicels, petioles and rachises.

[1]Core, Earl L. *The North American Species of Paronychia.* Am. Midl. Nat. **26**: 386–387. 1941.

[2]Hopkins, Milton. *Notes from the Bebb Herbarium of the University of Oklahoma.* RHODORA **45**: 268. 1943

Flowers were not present. Rydberg[1] gives the range of the species as: "western Texas to Colorado, Arizona and Chihuahua". Presumably it occurs across New Mexico to the Black Mesa in western Oklahoma.

*Petalostemum decumbens Nutt. was taken as *Waterfall* 7570 from a climax prairie 7 miles west of Hugo, Choctaw Co., July 18, 1947. Other sheets in our herbarium are: *Pearl Nelson* 70, Valliant, McCurtain Co., May 6, 1936; *Demaree* 12641, prairie, McCurtain Co., May 16, 1936; *Waterfall* 677, 3 miles west of Idabel, McCurtain Co., June 4, 1937.

*Rhus microphylla Engelm. This southwestern desert species was collected as *Waterfall* 7220 on the dolomite cap of a butte, 4 miles east and 4 south of Eldorado, Jackson County, June 20, 1947. It was also observed growing in abundance on the adjacent gypsum bluffs along the Red River. Barkley[2] lists the species from Hardeman Co., Texas, which is the adjoining county south of the Red River.

*Rhus trilobata Nutt., var. pilosissima Engl. is fairly common in the Black Mesa area. It is represented by: *Waterfall* 7476, base of escarpment, Black Mesa, 4 miles north of Kenton, Cimarron Co., July 9, 1947. Barkley[3] cites no Oklahoma collections, the nearest station, then known, being near Amarillo, Texas.

*Callirhoe lineariloba (Gray) Gray was collected as *Waterfall* 7284, sand dunes covered with *Artemisia filifolia* and *Aphanostephus skirrhobasis* on the north side of the Red River, 4 miles west and 4 miles south of Randlett, Cotton Co., June 27, 1947.

Cevallia sinuata Lag. was found growing on gypsum bluffs along the Red River, 4 miles east and 4 miles south of Eldorado, Jackson Co., July 29, 1947. It was collected as *Waterfall* 7705. *Waterfall* 7717 was taken from gypsum bluffs, south side of Elm Fork River, 3 miles west and 14 south of Eric, Harmon Co., July 29, 1947. The species is recorded by Jeffs and Little (op. cit.), but must be seldom collected within the state. We have no other specimens in our herbarium.

Echinocactus texensis Hoffer was collected as *Waterfall* 7704 from a buffalo grass (*Buchloë dactyloides*) pasture, 3 miles south of Gould, Harmon County, July 29, 1947. It is not recorded for Oklahoma by Britton and Rose[4] who give the range as "southeastern New Mexico, Texas and northern Mexico." Clark[5] has reported the species from the state: ". . . quite rare

[1] Rydberg, Per Axel, *Caesalpiniaceae*, N. Am. Fl. **23**: 312. 1930.

[2] Barkley, Fred A., *Anacardiaceae*, Flora of Texas **3**: 101. 1943.

[3] Barkley, Fred A., *A Monographic Study of Rhus*. Ann. Mo. Bot. Gard. **24**: 409–410. 1937.

[4] Britton, N. L. and J. N. Rose. *The Cactaceae*. **3**: 181. 1922.

[5] Clark, Ora M. *The Cacti of Oklahoma*. Proc. Okla. Acad. Sci. **13**: 34. 1933.

and local in its distribution over the clay and gypsum brakes of Harmon County." There are no previous collections in our herbarium.

Ludwigia glandulosa Walt., var. typica Munz. To var. *typica* may be referred *Waterfall* 7611, mud flats along creek, 7 miles east of Idabel, McCurtain Co., July 20, 1947. It is somewhat difficult to evaluate the reports of *L. glandulosa* in our flora. Stevens (op. cit.) lists the species, but attributes it to Oklahoma "acc. to Holz. and Olive." Jeffs and Little (op. cit.) list it, but there is no other sheet of var. *typica* in our herbarium. Stemen and Myers include it in their Flora (op. cit.), but their collections are not available for study. Munz[3] gives "southern Illinois and Indiana to eastern Texas" as being the range. This could include eastern parts of our state. At least the above number designates a confirmatory collection.

*Ludwigia glandulosa Walt., var. Torreyi Munz. In our herbarium is one sheet, *Little* 1651, Muskogee Co., June 18, 1927. Since Jeffs and Little's *List* was published in 1930, it is possible that this sheet is the basis for their inclusion of the species. Munz[1] states that the range of var. *Torreyi* includes Florida, Louisiana and Texas. This present report definitely places this variety within the state.

Ludwigia hirtella Raf. *Little* and *Olmstead* collected this species east of Broken Bow, McCurtain Co., June 28, 1930, as their No. 424. *Waterfall* 7597 was taken from oak-pine woods west of Tom, McCurtain Co., July 18, 1947. Munz[2] includes eastern Texas, but not Oklahoma, in his range-citation. Evidently, he had no material from our state. However, Stemen and Myers list it in their *Flora* (op. cit.).

Daucus Carota L. In our herbarium we have only two sheets of this introduced species. They are *Whaley* 63, Miami, Ottawa Co., and *Waterfall* 7018, bluffs along Highway No. 59, Adair Co., June 10, 1947. *D. pusillus* is quite common in Oklahoma.

Breweria Pickeringii (Torr.) Gray was taken as *Waterfall* 7370, stabilized sand dunes, 20 miles west of Medford, Grant Co., July 7, 1947. The species is little collected in our state. In the area where the above were taken it is fairly common. Our specimens have the style barely cleft to entire.

*Gilia laxiflora (Coulter) Osterhout. Referred to this species are: *Waterfall* 7444, sloping plains north of Black Mesa, north of Kenton, Cimarron Co., July 9, 1947; *Waterfall* 7486,

[1] Munz, Phillip A. *The American Species of Ludwigia.* Bull. Torr. Bot. Cl. 71: 164. 1944.

[2] Munz, Phillip A. *The American Species of Ludwigia.* Bull. Torr. Bot. Cl. 71: 157. 1944.

mesa slopes, 1 mile west and 1–2 miles WSW of Kenton, Cimarron Co., July 9, 1947.

*VERBENA AMBROSIFOLIA Rydb., forma EGLANDULOSA Perry. The forma is not listed from Oklahoma by Perry.[1] The author collected it as *Waterfall* 7437, stony hillside, 16 miles southeast of Kenton, Cimarron Co., July 9, 1947.

*VERBENA BONARIENSIS L. This species was collected as *Waterfall* 7599, along ditch, south of Tom, McCurtain Co., July 18, 1947. It has been known previously from near-by Texas, Arkansas and Louisiana.[2]

*SOLANUM TORREYI Gray, forma **album**, forma nov., corollis albidis. The TYPE of the white-flowered form was collected as *Waterfall* 7340, sand in small stabilized dunes, 1 mile east of Weatherford, Custer Co., July 3, 1947. The forma was also collected as *Waterfall* 7975, limestone ridge, 2 miles east and 7 south of Ada, Pontotoc Co., June 21, 1948.

VERBASCUM BLATTARIA L., var. ALBIFLORUM Ktze. was collected as *Waterfall* 7000, near pond surrounded by oak-covered, stony slopes, 4 miles north of Highway No. 62 on the Tynor Creek road to Ballard, Adair Co., June 9, 1947. The white-flowered variety is more abundant in southeastern Oklahoma, while the typical, yellow-flowered variety is more common in the northern part of the state.

*GALIUM CONCINNUM T. and G. I have the following collections of this species: *Waterfall* 6953, deep rich woods along creek south of Dripping Springs Park, Delaware Co., June 7, 1947; *Waterfall* 6968, steep stony bluffs in deep woods along Sager Creek, 1 mile east and 1 north of Mosley School (3 miles west and 2 north of Siloam Springs), Delaware Co., June 8, 1947. I do not find a previous record of *G. concinnum* in our flora.

LONICERA ALBIFLORA T. and G. This species has been previously known in our state from the Arbuckle Mountains. It was taken from the Wichita Mountains as *Waterfall* 7321, north slopes of granite mountains south of Lake Altus, Kiowa County, June 28, 1947.

*APHANOSTEPHUS RAMOSISSIMUS DC. was collected as *Waterfall* 7198, on dolomite knoll, 3 miles north of Duke, Jackson County, June 20, 1947; *Waterfall* 7790, saline flat 11 miles south of Gould, Harmon County, June 5, 1948; *Waterfall* 7794, buffalo grass pasture, 3 miles north and ½ mile east of Eldorado, Jackson County, June 5, 1948.

It is true that *Aphanostephus ramosissimus* is listed by Stemen

[1] **Perry, Lily M.** *A Revision of the North American Species of Verbena.* **Ann. Mo. Bot. Gar. 20: 328. 1933.**

[2] **Perry, Lily M.** *A Revision of the North American Species of Verbena.* **Ann. Mo. Bot. Gar. 20: 254. 1933.**

and Myers[1]. However, they do not mention *A. pilosus* Buckley. Their phrase, "foliage hispidulous", plus their range-statement, "Wichita Mountains", leads one to conclude that they actually had *A. pilosus* at hand, especially since Gray[2] includes *A. pilosus* with *A. ramosissimus* as "a remarkably hispid form." Shinners[3] includes "Edwards Plateau and north to the Panhandle" in the range of the species. It has been collected across the Red River near Vernon, Texas (*Shinners* 7978); hence it is not surprising to find it in a part of our state where there are numerous other species with southwestern affinities..

Baccharis Wrightii Gray is a fairly common species in the Black Mesa area in the western end of Cimarron County. The author has several numbers from that area. It is not listed by Jeffs and Little (op. cit.). Stemen and Myers (op. cit.) say that it is found in "dry prairies, Harper County."

Erigeron divergens T. and G., var. cinereus Gray is so abundant on slopes of the Black Mesa that it gives them a grayish-green color which may be seen for a mile or more. The author collected it as his number 7471, xeric northeast slopes of Black Mesa, 4 miles north of Kenton, Cimarron County, July 9, 1947.

Helianthus ciliaris DC. This species, little collected in our state, was taken as *Waterfall* 7417, ditch, 13 miles east of Boise City, Cimarron County, July 9, 1947. Locally it is fairly common in the western part of the Oklahoma Panhandle.

*Rudbeckia missouriensis Engelm. Referred to this species are plants taken as *Waterfall* 7567, prairie, 7 miles west of Hugo, Choctaw County, July 18, 1947. Small[4] states that the range is from Louisiana to Missouri.

Senecio tridenticulatus Rydb. was collected as *Waterfall* 7428, plains 8 miles east and 8 south of Kenton, Cimarron County, July 9, 1947. Greenman[5] lists three of Stevens' collections, without definite locality, from Oklahoma. Duplicates of two of these are all the material we have of this species in our herbarium. It is fairly common in the Black Mesa area of the Panhandle.

*Vernonia texana (Gray) Small was found in oak-pine (*P. Taeda*) woods, 2 miles south and 2 west of Tom, McCurtain County, July 18, 1947. It was collected as *Waterfall* 7589.

Department of Plant Sciences, University of Oklahoma, Norman, Oklahoma

[1] Stemen, Thomas R. and W. Standley Myers. *Oklahoma Flora:* 556. 1937.

[2] Gray, Asa. *Synoptical Flora of North America* **1**[2]: 163. 1886.

[3] Shinners, Lloyd H. *Revision of the Genus Aphanostephus* DC. Wrightia **1**: 109–111. 1946.

[4] Small, J. K. *Manual of the Southeastern Flora.* 1933.

[5] Greenman, J. M. *Monograph of the North and Central American Species of the Genus Senecio, Part II.* Ann. Mo. Bot. Gard. **3**: 179–183. 1916.

Polyploidy in Passiflora lutea.—Nearly fifteen years ago I found *Passiflora lutea* L. in Clarke Co., Virginia, near a limestone bluff overlooking the Shenandoah River. When dug up and moved to The Blandy Experimental Farm a few miles away, the plant thrived and has fruited profusely. Wray M. Bowden reported the $2n$-number of this collection to be 84 and published a root-tip metaphase showing this number of chromosomes (American Journal of Botany 32: 191–201. 1945).

On October 17, 1948, near Lake Drummond in the Great Dismal Swamp, Norfolk Co., Virginia, I came across a fruiting plant of *Passiflora lutea.* It grew among blackberries in a forest opening and on black muck soil. Because Bowden's chromosome-number determination was high for the genus, seed were taken from the Dismal Swamp specimen and planted in our greenhouse. Two seedlings have been cytologically examined: $2n = 24$.

These chromosome counts indicate that polyploidy exists in this species and suggest that there are intraspecific chromosomal races. If such races do occur, I would like to map their geographic—and perhaps ecologic—distributions and, accordingly, would appreciate it if collectors should send me seed or living plants accompanied by statements of exact locality and soil type. Gray's Manual records the species from southern Pennsylvania to Missouri, Texas, and Florida.—J. T. Baldwin, Jr., College of William and Mary, Williamsburg, Virginia.

Does Dicranum arcticum occur in southern central Quebec?—In his paper on Canadian Eastern Arctic mosses [*Musci*, Nat. Mus. of Can. Bulletin No. **97:** 393. 1947], Prof. Wm. C. Steere remarks that *Kiaeria glacialis* (Berggr.) Hagen is "A real circumpolar species of the Arctic zone. . . . Previously only once reported from the Canadian Eastern Arctic, and then from the southernmost [viz., Northern Labrador] part".

Consequently, an apparent problem in distribution arises when one discovers that the same species is listed, under *Dicranum arcticum* Schimp., a synonym, by Abbé Ernest Lepage ["*Liste des Lichens, Mousses et Hépatiques du Québec . . .*", Le Nat. Can. **72:** 319. 1945] for a station considerably south of the known range of the species.

The only record of the species for Quebec is based upon the collection by F. Marie-Anselme from Beauceville, Beauce County. The locality it comes from, lying in south-central Quebec, has not yet yielded any of the floristic elements which have made the Gaspé region the mecca of arctic-alpine species south of the 55th parallel in northeastern North America.

Through the kind courtesy of F. Fabius, s. c., the author has had access to the original collection, *No. 2854*, in the M.-Anselme herbarium, which bears the identification of *Dicranum arcticum.*

Assuming that the leaves bore a "nervure non-dentée", the specimen collected, on soil in a field, May 1, 1939, was named *D. arcticum.* Closer examination of the costa reveals the presence of weak teeth on the upper dorsal side. Transversal sections through the median nerve show it to consist of heterogeneous cells. The serration towards the leaf-apex is poorly developed but the upper leaf-cells are all elongate and porose.

Rather than leave the material under *D. arcticum* it would be more appropriate to place it with *D. scoparium* Hedw. while fully noting that the material shows considerable variation and under certain aspects might pass for *D. Bonjeani* DeNot.—James Kucyniak, Montreal Botanical Garden.

Dicentra Cucullaria f. purpuritincta in Quebec.—*Dicentra Cucullaria* (L.) Bernh. is a very common plant with us, with a distribution extending as far eastward as Rimouski Co. (Lepage), and Gaspé Co.: Ruisseau Sorel (Rousseau) and Mont Saint-Pierre (Dansereau). On the other hand, the more southern *Dicentra canadensis* (Goldie) Walp., is restricted to the Montreal region.

The present note reports the discovery of *Dicentra Cucullaria* (L.) Bernh. f. *purpuritincta* Eames, Rhodora **33:** 169, 1931, in Quebec. It was found on May 4, 1948, at Saint-Jean (Saint-Jean Co.), in a large deciduous wood which surrounds a quarry and which is noted for its rich spring flora. Saint-Jean is located midway between Montreal and the American border.

In the form, the corolla is pink while the sepals are reddish-purple. It was described from southwestern Connecticut and

was noted to be of rather frequent occurrence there. This striking plant exhibits a coloring not common in our spring flowers.—Marcel Raymond, Montreal Botanical Garden.

A most useful Series of Illustrations.—The new venture, Drawings of British Plants[1], will interest all in North America who wish good illustrations of a large proportion of our naturalized flowering plants, for it is to Britain and continental Europe that we are indebted for a large proportion of the plants which, beginning early in the 17th century, have more and more monopolized our disturbed or cleared areas. In fact, during the International Congress at Ithaca in 1926, the European delegates (Borza, Briquet, Chodat, Domin, Hill, Rendle, Svedelius, Wettstein and others) urged the present writer to take them where they could see some truly American plants. All which they had seen about the streets and fields near Ithaca were the common ruderal and agrestal weeds so familiar to them at home! Drawn by a discerning artist, with an eye for technical details of the species, the illustrations should be of utmost service to our floristic and taxonomic students, in showing exactly what the British plant is like, although it must not be overlooked that the plant found in Britain may sometimes differ from that described by Linnaeus or others from outside Britain; and, furthermore, that many European species, adventive with us, first reached us from the Mediterranean or other areas not British. These illustrations, then, are important for us, because in technical groups it is always possible that we have misidentified some of our species. The drawings will, therefore, help set us straight.

Not only our adventive or introduced weeds can thus be checked by those who lack abundant European material. The amphigean plants, native of northern or temperate regions, can be compared. The British *Anemone Pulsatilla, Myosurus minimus, Ranunculus trichophyllus, circinatus* or *reptans* and countless others can now be checked by anyone against their North American representatives; and now for the first time we can, possibly, clear the identities of the plants known with us as *Fumaria officinalis*, for that inclusive series is here illustrated as 10 different species and their reputed specific distinctions shown. It would be a great boon to the user, however, if there were something like diagnoses or keys and if the authenticity of the specimens illustrated were in some way indicated. The letter-file of the present writer contains a note from an outstanding English taxonomist, anxious to prove that a certain British plant is not conspecific with the American one to which it had been referred, pointing out that careful drawings of our plant in American monographs were of no value because the specimens drawn were not cited! In the new British work one has to put the same faith in the exact identity of the plant drawn as he does in many earlier illustrations of quite different plants under the names here used. In the new work, for instance in the case of Part II, plate 18, it is possible to meet difficulties. Without a key one becomes puzzled, for in the habit-sketch (under *Fumaria*) the bracts are shown chiefly as denticulate along the upper margin, but in fig. B the enlarged bract is drawn with this margin entire. Which is correct? Perhaps *Fumaria* is not finally solved.

The foreword to the series is written by Sir Edward Salisbury, Director of the Royal Botanic Gardens at Kew. Consequently, the recent ruling of Sir Edward that the scholarly practice of Kew botanists (as well as such respected

[1] *Drawings of British Plants* by Stella Ross-Craig, Royal Botanic Gardens, Kew. Foreword by Sir Edward Salisbury. Part I. Ranunculaceae; part II. Berberidaceae, Nymphaeaceae, Papaveraceae. Fumariaceae. June, 1948. G. Bell & Sons Ltd., York House, Portugal Street, London, W. C. 2. Pt. I 6 s. net; pt. II 4 s. 6 d. net.

taxonomists as Linnaeus, Lamarck, Willdenow, the DeCandolles, the Hookers, Bentham, Eichler, Kunth, Torrey, Gray and countless others) for many decades, of capitalizing the initial letter of personal specific names, must be abandoned, is here put into practice. This, it is assumed, is supposed to be "progressive"[1]. The results of the abandonment of capital initials for personal specific names may often be unfortunate. Thus, again referring to *Fumaria*, the species, *F. Bastardii*, was named by Boreau in honor of the great French botanist, TOUSSAINT BASTARD but, deprived of its capital initial, the name seems more a dishonor than an honor and one gets the impression that the parents of the distinguished botanist of Angers were blindly optimistic in selecting the given name Tous-saint!

But these little details aside, the new series of Drawings is bound to be most helpful and it will be almost as much needed in America as in Britain.—M. L. F.

OPHRYDIUM; A CORRECTION.—Through an error of the Editors the text-figures on page 5 were called "UNIDENTIFIED OPHRYDIUM". The caption should have been:

FIGS.: 1, individual, OPHRYDIUM animals; 2, animal condensing to a telotroch; 3, telotrochs or free swimming individuals; 4, telotrochs in resting state; 5, individual in process of binary fission?

Readers are asked to note this correction.—EDS.

[1] See note on this subject in RHODORA xlix. 79–81 (1947).

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CONTENTS:

Carlina vulgaris in the Cayuga Quadrangle, 42–43° N., 76–77° W. *Robert T. Clausen.* 33
A necessary Transfer in Liatris. *Haskell Venard.* 34
Contributions from the Gray Herbarium of Harvard University.— No. CLXIX.
Part I. Some Identities in Breweria. *M. L. Fernald and Bernice G. Schubert.* 35
Part II. Studies of Eastern American Plants. *M. L. Fernald*
1. Blackberries, old and new. 43
2. Rhizome-characters in and minor Forms of Viola. 51
A new Species of Sarcostemma from Oklahoma. *U. T. Waterfall.* 58
Herbarium Technique. *N. C. Fassett.* 59
Diervilla sessilifolia in Virginia. *Francis Welles Hunnewell.* 60

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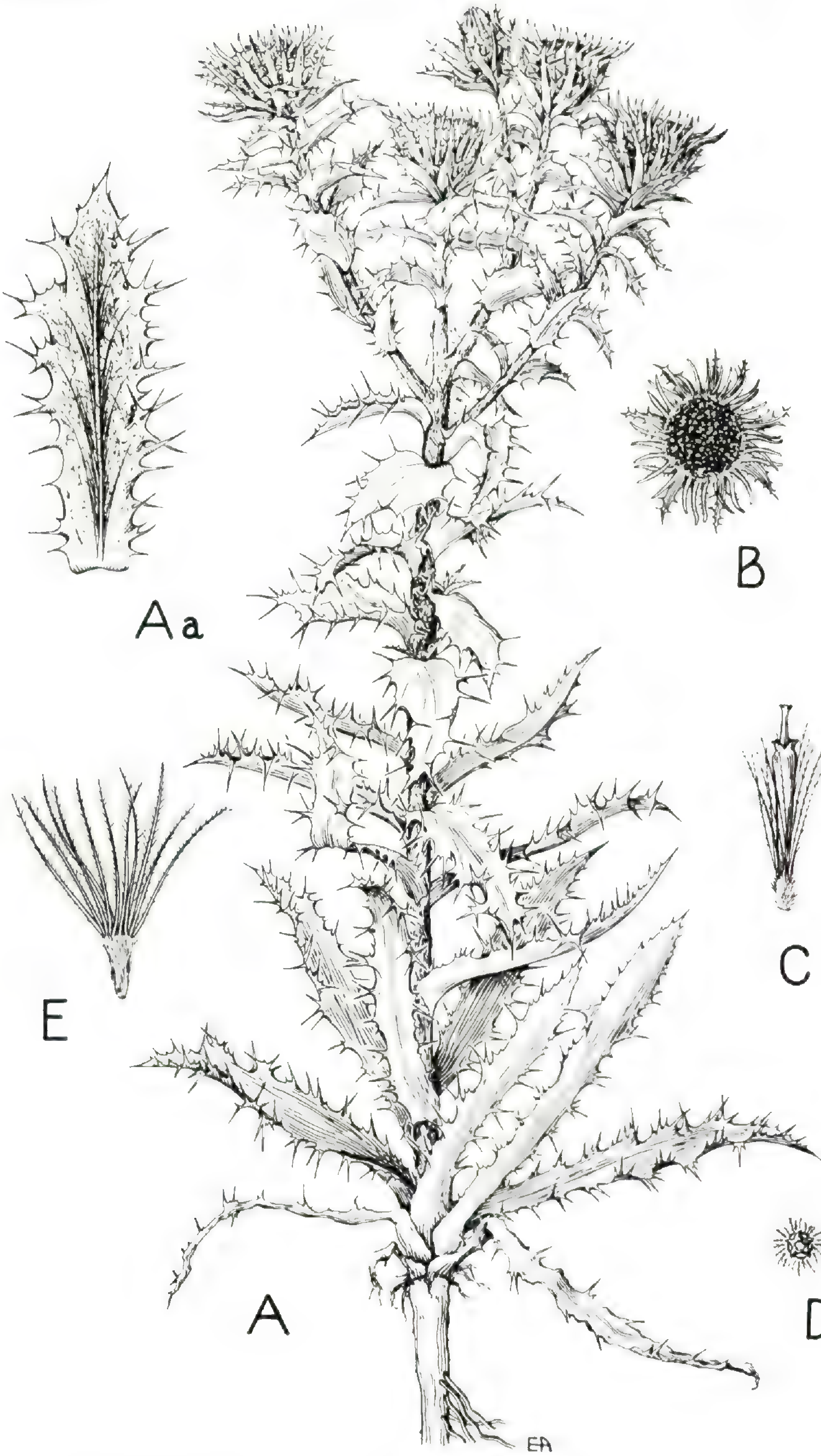

E. M. Abbe del.

CARLINA VULGARIS

Rhodora

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CARLINA VULGARIS IN THE CAYUGA QUADRANGLE, 42–43° N., 76–77° W.

Robert T. Clausen[1]

(Plate 1120)

In 1944, on April 9, while walking in open woods on the slope near the southwestern corner of Cayuga Lake, I observed a strange thistle which I was unable to identify with the aid of Gray's Manual or Britton and Brown's Illustrated Flora. Subsequently, in 1948, my class in taxonomy encountered many plants of this same thistle in the vicinity of Dryden, Tompkins County, New York. The first specimens, obtained in April, retained a few fruits which had persisted through the winter. The achenes were grayish and densely strigose, very different from those of species of *Cirsium*, *Carduus* or *Onopordum*, but the pappus was plumose as in *Cirsium*. The involucral bracts, spreading in rotate fashion, and the very spiny leaves, finely arachnoid-pubescent dorsally, were distinctive. Following failure to identify specimens with these characteristics using the manuals mentioned above or the books on weeds by Muenscher and by Fogg, I consulted the key to the genera of composites, prepared by Dr. Wilhelm Miller, in Bailey's Standard Cyclopaedia of Horticulture. There, I was able to determine the genus as *Carlina* and the species as *C. vulgaris* L. Subsequent comparison with herbarium specimens from Europe has substantiated this identification.

[1] The cost of publication of the accompanying plate is being met by the Department of Botany, Cornell University.

In the present season, 1948, I have followed with interest the development of *Carlina* in the vicinity of Dryden. The plants occur in several pastures and fields a few kilometers apart. One of the largest stands is in a pasture along a small brook 1.8 km. southeast of Dryden Lake. This pasture is in the extreme western portion of Harford Township, Cortland County, N. Y. There the plants had made good vegetative growth and were with large floral buds on July 25. Three weeks later, on August 15, many of these same plants were in flower. The specimen illustrated in the plate is a plant collected on that date. The heads were of striking appearance. The inner spreading involucral bracts were stramineous and acuminate. These contrasted markedly with the dahlia-purple florets. The corollas were slender-tubular, 8.5 mm. long, with the tubes purple above, white below, 7.5 mm. long, and the lobes ovate, acute, 1 mm. long. The purplish, lanuginose stems also were distinctive.

Inquiry or investigation at several institutions, namely the Gray Herbarium, New York Botanical Garden, New York State Museum, United States National Herbarium and University of California has failed to reveal other records of any species of *Carlina* in North America. For that reason, I have distributed specimens of my collection no. 7287 to all of these institutions. Also a sheet of this collection is in the herbarium of Cornell University, along with specimens collected on May 9 and July 25, 1948. The present note and illustration may help readers to identify *Carlina vulgaris* and cause them to be on the watch for its occurrence elsewhere. Since its seeds are disseminated by the wind, it may become a pest on agricultural lands in the same way as various species of *Cirsium*. The infestation around Dryden still could be controlled without too great expense. A little effort now might avoid considerable nuisance in the future.

Plate 1120. Carlina vulgaris from pasture near Dryden, New York. A. Habit sketch (× 0.4). Aa. Leaf, dorsal surface (× 0.8). B. Head from above (× 0.4). C. Floret from side (× 1.6). D. Floret from above (× 1.6). E. Fruit (× 2.4). Drawings by Miss E. M. Abbe.

Dept. of Botany, Cornell University, Ithaca, N. Y.

A necessary Transfer in Liatris.—In L. O. Gaiser's monograph, "The Genus Liatris", in Rhodora **48:** 250. 1946, *Liatris*

spicata γ *racemosa* DC. (1836) is included in the synonymy of *L. graminifolia* (Walt.) Willd., var. *dubia* (Barton) Gray (1848). Although Gaiser does not mention DeCandolle's variety in her discussion of the types of the various components of *L. graminifolia,* she does include it in the list of unquestioned synonyms. Since DeCandolle's variety antedates Gray's by twelve years, it would seem that a transfer is necessary, namely:

LIATRIS GRAMINIFOLIA (Walt.) Willd., var. **racemosa** (DC.), comb. nov., based on *Liatris spicata* γ *racemosa* DC. Prodr. **5:** 130. 1836.—HASKELL VENARD, Atlanta, Georgia.

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CLXIX

PART I. SOME IDENTITIES IN BREWERIA

M. L. FERNALD AND BERNICE G. SCHUBERT

(Plates 1121–1129)[1]

Disturbed by the fact that *Breweria Pickeringii* (Torr.) Gray rests upon a plant from southeastern North Carolina (Wilmington) which was originally described as having the central flower of each "aggregate" inflorescence sessile, whereas the plants of southern New Jersey, western Illinois and adjacent Iowa, and the Oklahoma-Texas region have them pedicelled, the senior author has borrowed from several of the larger American herbaria all the material which has passed as *B. Pickeringii.* The present notes summarize the results of our study of the assembled material from these strikingly disjunct areas and another region not generally included in the stated range. Before entering upon discussion of that species, however, it is important to clear the identities of some earlier described species in order that any references to them may not be misleading.

BREWERIA AQUATICA (Walt.) Gray, Syn. Fl. N. Am. ii[1]. 217 (1878), rests nomenclaturally on *Convolvulus aquaticus* Walt. Fl. Carol. 94 (1788), our PLATE 1121, FIG. 1. It has also been called *Stylisma aquatica* (Walt.) Chapm. Fl. So. U. S. 346 (1860) and *Bonamia aquatica* (Walt.) Gray, Man. ed. 5: 376 (1867).

[1] The cost of engraving met through aid from Mr. BAYARD LONG.

In all Gray's work, as summarized in the Synoptical Flora, he treated *Breweria aquatica* as a catch-all to include all plants of temperate North America in the subgenus *Stylisma* which he did not merge with the very different *B. humistrata* (Walt.) Gray and *B. Pickeringii* (Torr.) Gray. Under *B. humistrata* (our PLATE 1122) he placed the strikingly dissimilar *Convolvulus patens* Desr. (PLATE 1121, FIG. 2) and *C. trichosanthes* Michx. (PLATE 1123), while some specimens labelled by him as *B. humistrata* are of the very distinct *B. angustifolia* Nash (PLATE 1124). Nowadays, however, the name *Breweria aquatica* is generally applied to a plant with style cleft half way to base or still lower, filaments essentially glabrous, flowers mostly 3 in small corymbs, with the short bracts close to the base of the corymb, the pedicels and calyx densely villous (PLATE 1123), a plant which, we shall see, is quite unlike Walter's type. The name *C. trichosanthes* Michaux, as applied by Small, covers a plant very unlike Michaux's type (PLATE 1123, FIG. 1), for Small had a very slender plant, usually with narrower leaves, the solitary flowers long-stalked above the remote bracts, the calyx minutely tomentulose, the filaments villous (PLATE 1121).

It is evident that the types of Walter's *Convolvulus aquaticus*, Michaux's *C. trichosanthes*, Torrey's *C. Pickeringii* and some other types have entered only vaguely into recent interpretations. Walter's *C. aquaticus* was more fully described by him than many of his species:

> *aquaticus* 9. caule tereti prostrato; foliis, petiolis brevibus, oblongis, nervo acuminatis, pubescentibus, alternis; pedunculis axillaribus, unifloris, folia aequantibus; bracteis duabus subulatis; calyce pentaphyllo tomentoso; floribus brevibus, rubro-purpureis, tomentosis; stylo bipartito, capsula villosa.

Fortunately the Fraser scrap-book of fragments of Walter's plants contains definitely a "scrap" of *Convolvulus aquaticus*, no. 231 on p. 36 (our PLATE 1121, FIG. 1, × ½). This, so far as it goes, is identical with *C. patens* Desr. in Lam. Encycl. iii. 547 (1789), a portion of the TYPE of which is shown, × 1, in PLATE 1121, FIG. 2. This type-sheet had previously been shown by

Photo. B. G. Schubert

Breweria aquatica: fig. 1, type of Convolvulus aquaticus Walt., × ½; fig. 2, type of *Convolvulus patens* Desr., × ½; fig. 3, calyx and style, × 5, from southwest of Hinesville, Liberty Co., Georgia, *Wiegand & Manning*, no. 2632.

Photo. B. G. Schubert

Breweria humistrata: fig. 1, portion of flowering branch, × 1, from Pee Dee near Mars Bluff Bridge, Florence County, South Carolina, *Wiegand & Manning*, no. 2635; fig. 2, calyx and style, × 5, from east of Cahoon Pond, northwest of Suffolk, Virginia, *Fernald & Long*, no. 13,429.

Photo. B. G. Schubert

Breweria Michauxii: fig. 1, type, also type of Convolvulus trichosanthes Michx., × ½, after *Cintract;* fig. 2, portion of flowering branch, × 1, of "*B. aquatica*" of most auth. from Miami, Florida, *Curtiss*, no. 5855; fig. 3, calyx and style, × 5, from Punta Rassa, Florida, *Tracy*, no. 7719; fig. 4, portion of flower, × 5, to show long style-branches, from Miami, Florida, *Curtiss*, no. 5855.

Photo. B. G. Schubert

Breweria angustifolia: fig. 1, portion of plant, ×1, from Dixon, Onslow County, North Carolina, *L. F. & Fannie R. Randolph*, no. 962; fig. 2, calyx and summits of style, × 5, from near McClellanville, Charleston County, South Carolina, *Godfrey & Tryon*, no. 176, as *B. patens;* fig. 3, fruiting calyx, × 5, from no. 962.

Fernald in RHODORA, xlii. t. 624, fig. 1 (1940). Walter's fragmentary type and the fuller one of Desrousseaux are readily matched by many specimens from the southeastern United States, such as *Wiegand & Manning*, no. 2632 from Liberty County, Georgia, our FIG. 3, this, like many other similar collections, distributed as *Breweria trichosanthes* sensu Small. We are, somewhat inconveniently, forced to make the following change:

BREWERIA AQUATICA (Walt.) Gray, Syn. Fl. N. Am. ii[1]. 217 (1878), as to basonym only. *Convolvulus aquaticus* Walt. Fl. Carol. 94 (1788). *Conv. patens* Desr. in Lam. Encycl. iii. 547 (1789). *Stylisma aquatica* (Walt.) Chapm. Fl. So. U. S. 346 (1860), as to basonym only. *Bonamia aquatica* (Walt.) Gray, Man. ed. 5: 376 (1867), as to basonym only. *Breweria trichosanthes* sensu Small, Fl. Se. U. S. 959 (1903), not *Conv. trichosanthes* Michx., basonym. *Stylisma trichosanthes* sensu House in Bull. Torr. Bot. Cl. xxxiv. 148 (1907), not *Conv. trichosanthes* Michx., basonym. *Breweria patens* (Desr.) Fernald in RHODORA, xlii. 298, pl. 624 (1940). PLATE 1121.

As already pointed out by the senior author in RHODORA, l. c. the type of *Convolvulus trichosanthes* Michx. Fl. Bor.-Am. i. 137 (1803), our PLATE 1123, FIG. 1, × ½, therefore of *Breweria trichosanthes* (Michx.) Small, as to basonym only, is the plant which has been erroneously passing as *B. aquatica*. As indicating this identity a characteristic piece of a modern specimen, × 1, (from Miami, Florida, *Curtiss*, no. 5855) and some enlarged details from other specimens, × 5, are shown as figs. 2–4). Michaux's description and preserved TYPE are unequivocal; but, unfortunately, his specific name is illegitimate, since he cited as exact synonyms the two earlier species of Walter (1788), "*C. humistratus* et *aquaticus*. WALT." It is, therefore, necessary to use a different binomial; and since Michaux so clearly described his plant and left so characteristic a type we are calling it

BREWERIA **Michauxii,** nom. nov. *Convolvulus trichosanthes* Michx. Fl. Bor.-Am. i. 137 (1803), nom. illegit.; Fernald in RHODORA, xlii. 298 (1940). ? *Stylisma elliptica* Raf. N. Fl. N. Am. pt. iv. 55 (1838), not *B. elliptica* Smith & Schubert in Contrib. Gray Herb. cxxvii. 31, pl. 2, figs. 31 and 32 (1939). *B. trichosanthes* (Michx.) Small, Fl. Se. U. S. 959 (1903), as to basonym only, not as to plant described. *Stylisma trichosanthes* (Michx.) House in Bull. Torr. Bot. Cl. xxxiv. 148 (1907), as to basonym only, not as to plant described. *B. aquatica* sensu most Am.

auth., not as to basonym, *Convolvulus aquaticus* Walt. Plate 1123.

From the synonymy given by House in his study of *Stylisma*, Bull. Torr. Bot. Cl. xxxiv., especially p. 149 (1907), under *S. aquatica* in his sense, *i. e.* our *Breweria Michauxii*, one would infer that there are two names available for this species. The first, *Convolvulus erianthus* Willd. ex Spreng. Syst. i. 610 (1825), described "C. foliis linearibus elongatis basi attenuatis nudiusculis, . . . pedunculis elongatis 1 floris", etc. can hardly be our plant, which has the very pubescent elliptic-oval to oblong leaves broadly rounded to cordate at base and the peduncles mostly 3-flowered. Until the type of Willdenow's species can be studied it would be futile to guess what he had. House also cites as belonging to this species *Stylisma elliptica* Raf. "Fl. Tellur. **4**: 55. 1836". Obviously House did not closely inspect Rafinesque's account, for the species is not in Flora Telluriana (pt. 4 published in 1838) and p. 55 was occupied by generic and subgeneric segregates of Old World *Veronica*. In his New Fl. N. Am. pt. 4 (1838) Rafinesque described his *Stylisma elliptica* on p. 55. It is quite possible that Rafinesque had *B. Michauxii*, for his "leaves petiolate elliptical hardly pubescent, base subcordate, end obtuse mucronate" is rather definite for it (except "hardly pubescent") but "calix smooth" is not at all good for a closely pubescent calyx. This character and the "hardly pubescent" leaves immediately suggest *B. humistrata*. At any rate, the name cannot be taken over into *Breweria* because of the large-flowered Mexican *B. elliptica* Smith & Schubert (1939).

Now coming to the amazingly disjunct series known as *Breweria Pickeringii*, it is a somewhat striking fact that the type and few extant specimens of the original *Convolvulus Pickeringii* Torr. in M. A. Curtis in Bost. Journ. Nat. Hist. i. 129 (1835) seem not to be matched by any other collection nor has anything conspecific with it been found in the type-area, the famous and much explored region of Wilmington, North Carolina. Both *B. angustifolia* (plate 1124) and true *B. aquatica* (plate 1121), misidentified as *B. Pickeringii*, have been collected farther up the valley of Cape Fear River; but Curtis stated that "Most of the species enumerated inhabit a circle around this place [Wilmington] of about two miles radius". In 1830 the population of

Wilmington was about 3000; now it is about twelve times that number, with a considerable summer increase, and its longest diameter is 5 miles. That may account for the lack of recent collections. Even the connection with the Wilmington plant (collected by Moses Ashley Curtis) of Dr. Charles Pickering is a bit obscure. The species, as *Convolvulus Pickeringii,* was published in the *Catalogue of Plants growing spontaneously around Wilmington, North Carolina,* from a manuscript received in September, 1834. In his introductory pages Mr. Curtis said (p. 86): "In preparing the Catalogue I have been kindly assisted by Dr. Torrey, whose name will at once ensure confidence in its general accuracy. To him have been communicated nearly all the doubtful and new species, and they have received numerous corrections and references." There is also acknowledgment of help from Dr. James F. McRee, but nothing about Pickering. On p. 105, under *Convolvulus,* there is an entry "Pickeringii. Tor. (26)", this indicating that Torrey was author of the name, and in the "Remarks on several Plants in the Catalogue" no. 26 (p. 129) is as follows:

> (26) *Convólvulus Pickeríngii.* Prostrate, villous; Leaves linear, 12–15 lines long, one line wide, obtuse, not mucronate; Peduncles longer than the leaves, 3 flowered; Flowers aggregate at the summit, two of them pedicelled in the axis of the leaves that exceed the flowers, with linear bracts at the base of the calyx which equal the flowers, the other sessile and without bracts. The upper peduncles become 2 and 1 flowered. Calyx very villous. Corol hairy, white; style 2 cleft a little below the summit, the parts unequal; Stigmas capitate. Hab. sandy barrens. Flowers June.
>
> Allied to C. patens, but clearly distinct. First noticed by Dr. Pickering, to whom it is dedicated.

The original material sent to Torrey had Curtis's comment: "Nearer C. trichosanthes, var. patens Ph. than Elliott's C. aquatica?". In the remark of Torrey (or perhaps Curtis) at the end of the description there is the clue to the origin of the specific name. Charles Pickering had collected the New Jersey variety six years earlier, the label (in his own hand) of his specimen in Herb. Phil. Acad. reading:

> (capsule one-seeded!)
> 4 miles from Quaker Bridge N. J.
> Aug. 1828. C. Pickering

A portion of this Pickering specimen, characteristic for New Jersey, is shown in PLATE 1126, FIG. 1. That it superficially resembles *Convolvulus patens;* i. e. true *B. aquatica* (PLATE 1121, FIG. 2) is obvious, but it has elongate foliaceous bracts, shorter and blunter sepals and (when adequate material is examined) less deeply divided styles. Although the name *Pickeringii* was based on the New Jersey plant, the detailed description and the locality (Wilmington) of the Curtis plant (PLATE 1125) indicate that as the TYPE of the species. It is singular that Torrey did not enter the name on what is obviously the TYPE-sheet. In DC. Prodr. ix. 450 (1845) *Convolvulus Pickeringii* was called *Stylisma evolvuloides* Choisy, β. *angustifolia* Choisy, although the specimen seen was "comm. a Gray!", who had collected the New Jersey plant only. Incidentally, Choisy's *S. evolvuloides* could not have been more inclusive: made up of *Convolvulus humistratus* and *aquaticus* Walt., *C. patens* Desr., *C. tenellus* Lam. and *C. trichosanthes* Michx.!

As we interpret *Breweria Pickeringii*, the aggregate species (MAP 1) is characterized by its very narrow linear or linear-oblanceolate leaves; elongate peduncles bearing 1–3 (rarely–5) flowers, each inflorescence subtended by a pair of elongate bracts similar to the foliage-leaves, the densely pubescent broad sepals blunt or in two varieties pointed, the style shallowly cleft to barely notched or subentire. The remarkable disruption of range has resulted in the local fixity of some characters, although in the aggregate these isolated varieties have the most significant characters much alike. Typical *B. Pickeringii* (PLATE 1125), the plant of Wilmington, North Carolina, has the pubescence of branches, pedicels and sepals densely villous; the central flower of each small corymb or the single flowers sessile; the 2 lateral flowers of the 3-flowered corymbs on pedicels only 1–4 mm. long and 2-bracted at summit, the longer of the unequal branches of the style 2–3 mm. long.

Isolated from it, about 400 miles to the north, is the variety (PLATES 1126 and 1127) found locally in the Pine Barrens of New Jersey. Like typical *Breweria Pickeringii* in habit, foliage, pubescence, blunt sepals and style (except that the 2 branches may often be subequal), it has the single flower or the central one of 2–5-flowered corymbs raised above the bracts on a definite

Photo. B. G. Schubert

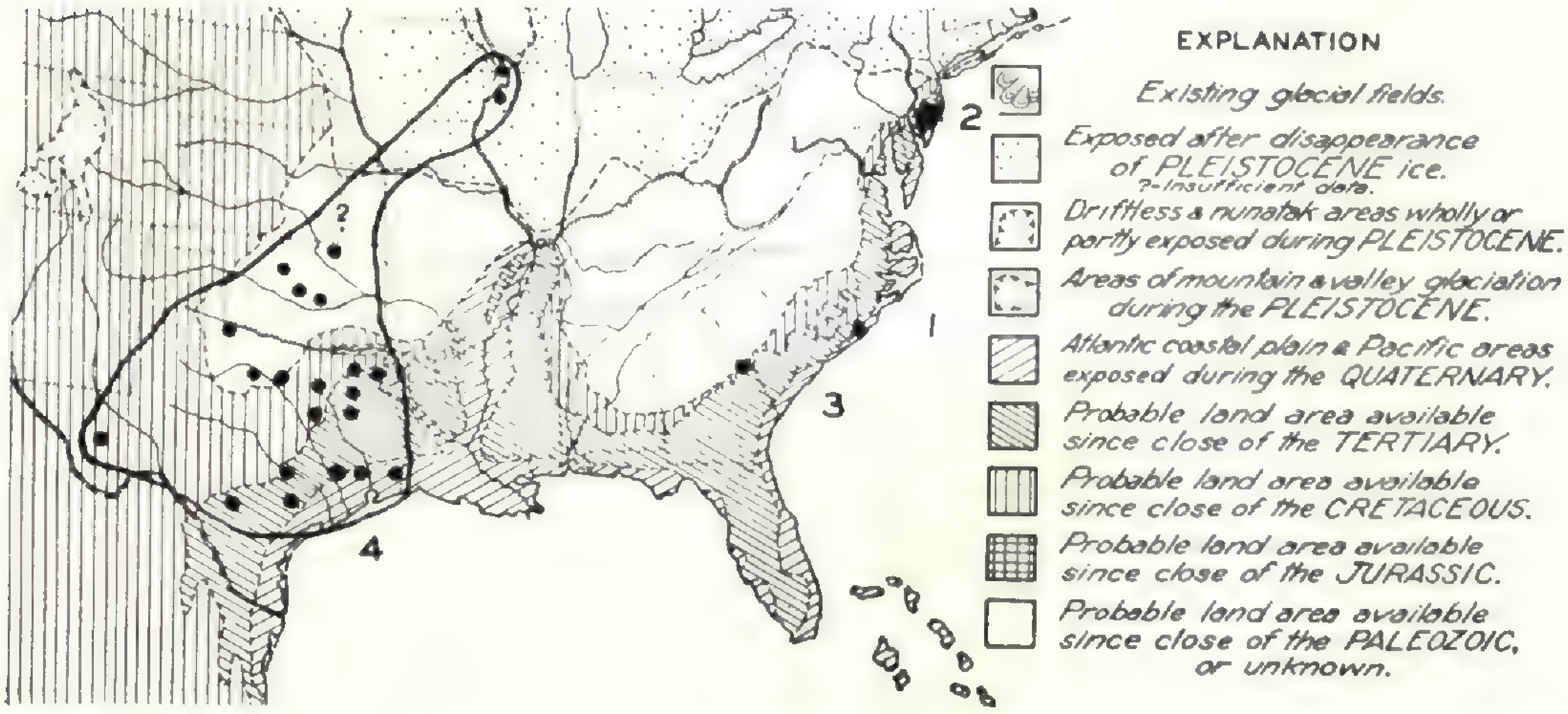
BREWERIA PICKERINGII: FIG. 1, TYPE, × 1; FIG. 2, an inflorescence, × 5, showing subsessile central flower and 2-cleft style.

Photo. B. G. Schubert

BREWERIA PICKERINGII, var. CAESARIENSIS: FIG. 1, portion of the Pickering plant from New Jersey, × 1, source of the name but not the description of the Curtis plant from Wilmington, North Carolina; FIG. 2, Pickering's label, × 2; FIG. 3, calyx and style, × 5, from the Pickering plant.

pedicel and the pedicels of the lateral flowers 0.5–1.5 cm. long. This localized plant we are calling var. *caesariensis*.

Near the fall-line, on the Savannah River, more than 250 miles southwest of Wilmington, the late Alfred Cuthbert collected on the sandhills near Atlanta, Georgia, a plant (PLATE 1128) which looks like *Breweria Pickeringii*, var. *caesariensis*, having the flowers all pedicelled, the lateral ones with pedicels up to 1.5 cm. long, but the sepals, instead of being blunt, are acuminate, a character suggesting *B. angustifolia* (PLATE 1124),



RANGES OF (1) BREWERIA PICKERINGII, var. ANGUSTIFOLIA; (2) var. CAESARIENSIS; (3) var. CUTHBERTII; (4) var. PATTERSONI.

but var. *Cuthbertii* has the elongate foliaceous involucre and involucels (FIG. 2) and the only slightly cleft style of *B. Pickeringii*, with which Cuthbert originally identified it.

These three varieties of the Atlantic states form a consistent series, marked by the positively cleft style (with longer branch 2–3 mm. long), sepals blunt (except in the little known var. *Cuthbertii*) and the villosity tending to be fulvous. Farther west and still more isolated from the plants of southeastern North Carolina and of New Jersey there is a very strongly marked variety (PLATE 1129) with all the characters of the Atlantic series, except for a more canescent and closer pubescence, acute or acutish sepals (as in var. *Cuthbertii*) and, most marked of all, styles subentire or very shallowly cleft, with the longer branches rarely 1 and very rarely 1.5 mm. long. The difference in the branching of the style is the most significant, the acute or acutish

sepals less so, and the canescence of the pubescence probably a long-time response to more inland environment. We are, therefore, looking upon this more western plant as a far-isolated and itself bicentric variety, the larger area in Texas and Oklahoma, the smaller on dry prairies of Muscatine County in southeastern Iowa and of adjacent Henderson County, Illinois. It thus approaches the northeastern corner of Missouri, a state from which it is not reported (doubtless Missourians would not admit that they have land sterile enough for it). This distinctive plant of dry prairies we are naming for the keen botanist of Henderson County, Illinois, the late Harry N. Patterson, whose model specimens are found in most of the herbaria studied.

B. Pickeringii (Torr. in M. A. Curtis) Gray, var. **angustifolia** (Choisy), comb. nov. *Convolvulus Pickeringii* Torrey in M. A. Curtis in Bost. Journ. Nat. Hist. i. 105 and 129 (1835). *Stylisma evolvuloides* Choisy, *β. angustifolia* Choisy in DC. Prodr. ix. 450 (1845). *Bonamia Pickeringii* (Torr.) Gray, Man. ed. 5: 376 (1867). *Breweria Pickeringii* (Torr.) Gray, Syn. Fl. N. Am. ii[1]. 217 (1878).—Characterized by its villous and rather fulvous pubescence; peduncles with linear or linear-oblanceolate foliaceous paired bracts at summit; flowers 3 in a close corymb or on the terminal shoots solitary, the central one sessile, the lateral ones on pedicels only 1–4 mm. long; sepals obtuse; style distinctly 2-cleft, the longer branch 2–3 mm. long.—Known only from the type-collection, from dry sand, Wilmington, North Carolina, June, 1834 (type) in Torrey Herb. (N. Y. Bot. Gard.), isotypes in Herb. Mo. Bot. Gard. and Herb. Phil. Acad. Plate 1125.

Var. **caesariensis,** var. nov., a var. *angustifolia* differt floribus 1–5, omnibus pedicellatis, pedicellis lateralibus 0.5–1.5 cm. longis. —Dry sandy woods and openings, local, Pine Barrens of New Jersey. Type: along Mullica River southwest of Batsto, August 21, 1910, *Bayard Long* in Herb. Phil. Acad. Plates 1126 and 1127.

Var. **Cuthbertii,** var. nov., a var. *caesariensi* differt sepalis acuminatis.—Georgia: sandhills, Augusta, June 29, 1901, *Alfred Cuthbert*, type in Herb. N. Y. Bot. Gard. Plate 1128.

Var. **Pattersoni,** var. nov., caulibus pedicellis calycibusque plus minusve cinereo-pubescentibus; floribus pedicellatis; sepalis acutis; stylo subsimplice, subintegro vel breviter diviso, ramo longiore rariter 1 vel 1.5 mm. longo.—Dry sandy prairies, Henderson County, Illinois and Muscatine County, Iowa; more frequent in Oklahoma and widespread in eastern and southern Texas.[1]

[1] In the United States National Herbarium there is a sheet from the Department of Agriculture bearing the data "Kansas, E. A. Papinoe, 1875". Otherwise we know of no evidence of the plant in Kansas.

Photo. B. G. Schubert

Breweria Pickeringii, var. caesariensis: fig. 1, portion of type, × 1; fig. 2, branch showing fuller inflorescences, × 1, from Pleasant Mills, New Jersey, July 27, 1882, *H. R. Bassler;* fig. 3, fruiting calyx and style, × 5, from New Jersey, *Knieskern.*

Photo. B. G. Schubert

BREWERIA PICKERINGII, var. CUTHBERTII, all figs. from TYPE: FIG. 1, TYPE, × ½; FIG. 2, an inflorescence, × 1⅖; FIG. 3, calyx, × 5.

Photo. B. G. Schubert

Breweria Pickeringii, var. Pattersoni: fig. 1, portion of type, × 1; figs. 2 and 3, calyces and styles, × 5, from type: fig. 4, calyx and notched style, × 5, from Grant Co., Oklahoma, *Waterfall*, no. 7370: fig. 5, calyx and entire style, × 5, from Weatherford, Texas, *Tracy*, no. 8068.

Type: prairies near Oquawka, Illinois, August, 1873?, *Harry N. Patterson* in Herb. Patterson, Chicago Nat. Hist. Mus. Plate 1129.

In this study we have had the advantage of seeing the material in the following herbaria, besides that in the Gray Herbarium: New York Botanical Garden; Academy of Natural Sciences of Philadelphia; United States National Herbarium; Duke University; State College of University of North Carolina, Raleigh; Chicago Natural History Museum; Missouri Botanical Garden; and University of Oklahoma (including a fine series of freshly collected specimens). To the officials of these institutions who have aided us by these loans we express our thanks and appreciation. Without these loans we should have remained in the dark regarding the original Curtis material and the unique var. *Cuthbertii.*

Part II. STUDIES OF EASTERN AMERICAN PLANTS

M. L. Fernald

1. Blackberries, old and new (Plates 1130–1132)

Rubus allegheniensis Porter, forma **suffultus,** f. nov. (tab. 1130, fig. 1), racemis valde bracteatis, bracteis 6–15 pedicellos plerumque superantibus.—Locally abundant in New England. The following are characteristic. New Hampshire: abundant in large colonies, Shelburne, *Fernald & Pease*, no. 15,738 (distrib. as var. *Gravesii* because essentially without prickles); border of dry woods, Shelburne, *Fernald & Pease*, no. 15,763; damp thickets, borders of woods and roadsides, Thornton Gore, *Fernald*, nos. 15,655, 15,700, 15,749 (type in Herb. Gray.; isotype in Herb. New Engl. Bot. Cl.), 15,820; dry open sandy soil, Haverhill, *Fernald*, no. 15,771. Massachusetts: Beverly, 1886, *Asa Gray;* Ayer, May 30, 1934, *Ordway & Bullard;* roadside thicket, West Brookfield, July 9, 1935, *C. H. Knowlton;* dry roadside, Konkapot Valley, New Marlboro, July 24, 1912, *Ralph Hoffmann.* Connecticut: below "Indian Burying Ground", Franklin, June 18, 1915, *R. W. Woodward;* Bristol, "a freak", *Blanchard*, no. 97, set 5; Southington, *Blanchard*, no. 97, set 3.

Although called by Blanchard "a freak", forma *suffultus* is, where I have well known it in the Franconia and the Androscoggin regions of New Hampshire, an abundant and very obvious and consistent plant of recent clearings and borders of woods.

Plate 1130, fig. 1 shows the extreme development of racemes, much prolonged and with most of the pedicels subtended by simple overtopping bracts; but clear transitions to more typical *R. allegheniensis* occur. Thus, on no. 15,655 the upper racemes have 9–11 bracts but lower on the cane the lateral racemes are those of typical *R. allegheniensis*, with only 1–5 bracts. Forma *suffultus* suggests Bailey's illustration in Gent. Herb. v. 12, fig. 3 (1941) of a "novirame"; but the bracteate inflorescences of forma *suffultus* are the regular racemes of floricanes, not "novirames" on the primocanes!

R. allegheniensis, forma **calycosus** (Fernald), stat. nov. *R. nigrobaccus*, var. *calycosus* Fernald in Rhodora, iii. 234 (1901). *R. allegheniensis*, var. *calycosus* (Fernald) Fernald, l. c. x. 51 (1908); Bailey, Gent. Herb. v. fig. 232, E (1944).

I am holding *Rubus allegheniensis* in its inclusive sense for the relatively coarse, erect to high-arching species with velutinous lower leaf-surfaces, cylindric racemes mostly 1–3 dm. long and with stipitate glands numerous on rachis and pedicels. In so doing I heartily indorse Bailey's sensible attitude of 1902 in Cycl. Am. Hort. iv. 1578, when he wrote: "No end of species could be made, but it is doubtful whether a great multiplication of species-names would contribute anything more than confusion to the literature and knowledge of the genus" and (p. 1582) "There seems to be little utility in separating forms that cannot be distinguished in at least a fair proportion of the specimens". I cannot, however, wholly indorse the reverse attitude now so much in evidence because altogether too many minor variants and clones are being put out as "new species", for the author of the conservative and wholly safe doctrine of 1902 wrote in 1925 of "aberrants" which "may be species, nascent species, or kinds of nonconformities" and then went on to assure us that his "new species" are not necessarily true or conventional species after all:

> "It will be understood, therefore, that when I write 'new species' (or *species nova*) I do not use the term in its old formal final sense; I am thinking of a congeries of plants so harmonious within itself and so distinct from all others as to require name and diagnosis if we are to discuss the subject intelligently; and I regret that modern practice has not given us a word of clearer accuracy and significance". —Gent. Herb. i. 205 (1925).

Some of the terms for minor variants which were used by

Ascherson & Graebner or the terms variety, subvariety, forma, forma biologica, forma specialis and individual or clone were available. Bailey, l. c., was opposed to throwing "them loosely or uncritically into some recognized species: this extends the confusion". But perhaps much that has been published on the group can hardly escape the tag, "uncritical"; at least it has often indicated "confusion".

To me there is no satisfaction, after many days of struggling with them, in trying to separate from *Rubus allegheniensis* (*R. nigrobaccus* Bailey) such selected and surely intergradient nearly *conformist* plants of Bailey, Gent. Herb. v. fasc. viii (1944) as *R. auroralis* (pp. 525, 526), *R. longissimus* (pp. 527, 528), *R. virginianus* (pp. 532, 533), *R. separ* (pp. 532, 534 and 535), *R. uber* (pp. 535 and 536), and *R. marilandicus* (pp. 537, 538); nor can I see anything more than a useless synonym in the name *R. Rappii* Bailey in Hanes, Fl. Kalamazoo Co., Mich. 156, fig. 14 (1947). To be sure, *R. longissimus* is distinguished, among other inconstant characters, in the key by "broad short obovate leaflets at base" of the "cluster 20 cm. long", but the bracteal leaflets shown in fig. 230 of characteristic *R. allegheniensis* are much more obovate, while, if they are significant, plenty of New England specimens with racemes up to 3 dm. long could be made to glorify all the sisters, cousins and aunts of the chance collectors. Furthermore, by the key *R. allegheniensis* comes under "Prickles on primocane axis many", while *R. virginianus* has "Prickles on primocane very few or none". Nevertheless, comparison of the figure of *R. allegheniensis* (fig. 230) and that of *R. virginianus* (fig. 240) shows about 13 small prickles on 14 cm. of primocane of the former ("Prickles . . . many") but 14 on 17 cm. of primocane of the latter ("Prickles . . . very few or none"). That seems like a pretty vague "specific" difference.

Again, I find myself equally puzzled (and others must be similarly so) by other reputed species of the § *Alleghenienses*. Under "B" in the key in Gent. Herb. v. 509, 510 (1944) *Rubus Rosa* Bailey and *R. alumnus* Bailey come under "Primocane leaflets . . . cordate", while *R. apianus* is under "BB. Primocane leaflets . . . not cordate, narrow or tapering to base . . . ". Unfortunately, however, the would-be interpreter notes that the terminal primocane-leaflet of the last "species" is shown in fig.

252 as broadly ovate and somewhat cordate. Its apex is not quite so prolonged as shown for *R. Rosa* but the difference between this leaflet and the terminal "cordate" one shown for *R. alumnus* is scarcely evident.

As Bailey so forcefully stated in 1902, the designation of many trends as species can contribute nothing "more than confusion to the literature and knowledge of the genus". If he joined the once aggressive group of "mutationists" who saw a species in every clone and hybrid in *Oenothera* he could add still further "confusion"; or if he tackled *Carya* he could find hundreds of his "species" in every hickory-forest, for it is never safe to collect as one number specimens from two adjacent trees! "There seems to be little utility in separating forms that cannot be distinguished in at least a fair proportion of the specimens". Incidentally, it should not be overlooked that, nowadays, when Bailey calls a plant a "species", he does "not use the term in its old formal final sense". If he were an anthropologist what would he do with *Homo sapiens?*

§ *Alleghenienses* is well defined in Gent. Herb. v. 507 (1944) as "Gland-bearing highbush . . . brambles, . . . often very stout . . . inflorescence typically a long racemiform cluster with continuing axis . . . ; rachis of inflorescence, pedicels, usually the calyx, as mostly also the petiolules and parts of petioles, bearing stalked glands". That defines a well marked and generally understood section. It is, therefore, more than a bit perplexing to find in recent publications proposed new species, designated as belonging to the *Alleghenienses*, which patently lack these distinctive characters and as definitely display the significant characters of other defined and generally recognized sections. As striking and as disconcerting as any is *Rubus Bigelovianus* Bailey, l. c. iii. 255 (1934) and v. 558, fig. 245 (1944), a plant with the aspect, slender and bristly canes, essential lack of glands, cuneate floricane-leaflets, and inflorescence and fruits of § *Setosi;* for this very characteristic section is described, l. c. 129, as "plants, of small size . . . characterized . . . by setose or stouter . . . armature on canes and pedicels and by rather short inflorescence that is likely in infrutescence to become as broad as long and cymiform . . . : floricanes often lopped or prostrate even though primocanes may be erect . . . , seldom

much more than about 80 cm. tall, . . . flowers small, commonly with narrow well separated petals: fruit small, usually acid and not pleasantly edible".

Rubus Bigelovianus, collected while Bailey was looking for *R. setosus* Bigel. in the general type-area, Sudbury, Massachusetts, and named for Jacob Bigelow, "commemorated his visit to Sudbury", presumably referring to the collection of *R. setosus* in June, 1823. Otherwise it would be most difficult to say what visit was commemorated, for Jacob Bigelow pleased his parents by making his first recorded "visit" at his birth in Sudbury on February 27, 1787, and his home was in Sudbury until he took up medical practice in Boston, his parents still continuing to reside at Sudbury[1].

RUBUS ALLEGHENIENSIS Porter, var. **populifolius,** var. nov. (TAB. 1130, FIG. 2), a var. typica differt foliolis vel laminis bractearum elliptico-ovalibus vel subrotundatis obtusis 2.5–5 cm. longis latisve.—MASSACHUSETTS: border of woods, Stockbridge, July 16, 1916, *Ralph Hoffmann* (TYPE, 3 sheets, in Herb. New Engl. Bot. Club).

In the strongly rounded blades and leaflets of the bracteal leaves var. *populifolius* at once suggests *Populus tremuloides* and by some might be called a distinct species. Its primocane, however, has very characteristic leaves of typical *Rubus allegheniensis*, the long-petiolulate median and terminal long-acuminate leaflets cordate-ovate. The specimens were sent in as *R. Andrewsianus* Blanchard but they have the heavily stipitate-glandular petioles, petiolules, rachis and pedicels and the elongate raceme of *R. allegheniensis*.

Rubus Andrewsianus is one of the fifteen or twenty minor variants of *R. pensilvanicus* Poir. (1804) which have been designated as "species", a score which could be vastly multiplied if collections were made and named from tens of thousands of other burns and recent clearings. *R. pensilvanicus* and its host of minor variants belong to the series under § *Arguti*, which is characterized by lack of glands and by a corymbiform inflorescence. As an aggregate of minor trends, occurring through much of temperate eastern North America, it includes not only *R. Andrewsianus* but *R. philadelphicus* Blanchard, *R. pergratus*

[1] See GEORGE E. ELLIS. Memoir of Jacob Bigelow, Cambridge, 1880. Incidentally, see Fernald in Proc. Am. Phil. Soc lxxxvi. 68 (1942).

Blanchard and many others. If anyone is skeptical, let him look at four plates in Gent. Herb. v: figs. 315 and 316 (*R. pensilvanicus*), 319 (*R. Andrewsianus*) and 321 (*R. philadelphicus*). Then, if he finds *specific* or any significant differences, let him illuminate those of us who have wasted many days in searching for them.

To be sure, the key (pp. 610 and 611) puts *Rubus pensilvanicus* under "Axis or peduncle of flower-cluster and the pedicels armed with stout thick-based strongly curved or hooked prickles", while *R. Andrewsianus* is under a contrasting "Axis or at least the peduncle of flower-cluster and the pedicels naked, or the prickles, if any, few and weak and not broad-based nor hooked". Nevertheless, the TYPE of *R. pensilvanicus*, as shown in the photograph sent to me from Paris, shows 16 of the 25 pedicels which are clearly visible quite without prickles, this type shown in Bailey's fig. 315, while the fruiting branchlet "a" shown by him as representative of this species, distinguished by "pedicels armed with stout thick-based strongly curved or hooked prickles", has all the pedicels shown as unarmed! In the figure (319) of *R. Andrewsianus* one can count 8 slightly armed pedicels, while in Blanchard's "set 1" from "type sta." in the Gray Herbarium several pedicels have two hooked prickles up to 2 mm. long. Again, try the illustration of *R. philadelphicus* (fig. 321). By the key (pp. 610 and 611) *R. pensilvanicus* and *R. Andrewsianus* have the "Floral leaflets and simple leaves (in the flower-cluster) . . . decidedly acute to acuminate or attenuate", those of *R. philadelphicus* "obtuse or only briefly abruptly acute". Nevertheless, there seems to be no definable difference in the tips of the leaflets as shown, for in "a", under *R. pensilvanicus*, the bracteal leaves and leaflets are shown as scarcely different from those of the others. If these are really different species they have successfully hidden their distinctive characters and they are, at best, "nascent species, or kinds of nonconformities not yet accounted for in our philosophies" (Gent. Herb. i. 205), reminding one of the simple and ungarnished yankee philosophy of Blanchard when he wrote, regarding another species: "The plants at all these stations differ a little from each other, but even at the type station a difference in soil and surroundings causes a considerable variation. This is to be expected nearly everywhere in the rose family"—Blanchard in Torreya, vi. 120 (1906).

Blanchard, of course, did not take into account Poiret's *R. pensilvanicus*, for, accepting the verdict of Index Kewensis, everyone supposed, until I secured a photograph of Poiret's type, that his species was "*R. strigosus*"!

As for *Rubus pergratus* Blanchard in Rhodora, viii. 96 (1906), that characteristic plant of southeastern Canada and New England, where its fruit is highly esteemed, seems to be a strong and large-fruited development of *R. philadelphicus*, with no clear morphological differences. As defined by Blanchard it has the primocanes bearing prickles which are "strong, stout, 2 to 8 to the inch of stem,"—the leaves pubescent beneath, the flowering shoots more or less pubescent, "even woolly on some"; *i. e.* it belongs in the § *Arguti*, which is defined by Bailey (Gent. Herb. v. 46) under "Leaves (and other parts) variously pubescent . . . prickles usually abundant, mostly hooked or bent or at least broad-based". But, for some reason not clear to others, *R. pergratus* has disappeared from his treatment of the *Arguti* and is placed under the § *Canadenses*, this section properly defined (l. c.) as having "Leaves essentially smooth . . . : canes without prickles or with only few and weak straight ones". This plant, with leaflets velvety to touch beneath, with stout hooked prickles and with a corymbiform inflorescence, has suddenly appeared, not only in § *Canadenses*, but under *R. canadensis* itself ("known by its thin usually glossy smooth foliage [by "smooth" meaning glabrous] . . . and in typical forms by its nearly or quite unarmed canes: . . . inflorescence . . . the primary narrow long-racemiform clusters") as *R. canadensis*, var. *pergratus* (Blanchard) Bailey, l. c. v. 470 (1944), with "Leaves soft-pubescent to the finger underneath, therefore gray and the lateral ribs more or less obscured", overlooking the strong prickly canes, the corymbiform inflorescence, etc. If the characters used in defining the sections mean nothing it is time to give up. They do, however, hold reasonably well if one will refrain from contradicting them and from describing in the glabrous § *Canadenses* plants with copious pubescence, or in the copiously glandiferous § *Allegheniensis* plants without glands, etc. The confusion is not primarily in the sections.

R. pensilvanicus Poir., forma **phyllophorus,** f. nov., racemis plus minusve elongatis, bracteis numerosis.—With the typical

few-bracted plant or in more favorable habitats. The following belong here. Nova Scotia: rich moist open thicket by brook, Sandy Cove, Digby County, *Fernald & Long*, no. 21,592, as *R. orarius;* spruce woods and thickets, Brazil Lake, Yarmouth Co., *Bartram & Long*, no. 23,991, as *R. orarius*. New Hampshire: borders of dry woods near Mascot Pond, Gorham, *Fernald & Pease*, no. 15,643, as *R. orarius;* dry thickets and borders of woods, Lincoln, July 28, 1917, *Fernald*, no. 15,701 (type in Herb. Gray); damp thickets, borders of woods and roadsides, Thornton Gore, *Fernald*, no. 15,642.

In its very leafy-bracted raceme resembling *R. allegheniensis*, forma *suffultus* (pl. 1131, fig. 1) except for its glandless and more corymbiform raceme and the subglobose fruits, characters which place it with the polymorphic *R. pensilvanicus* of § *Arguti*. See discussion above.

Rubus (§ Alleghenienses) **sceleratus** Brainerd, sp. nov. in lit., tab. 1131 et 1132, valde adscendens inextricabiliter arcuato-ramosus, cannis tholos 1.8–3 m. altos formantibus; primocannis ad 1 cm. diametro densissime armatis; aculeis rectis horizontalibus deltoideo-subulatis vel subulatis vel aciculiformibus, glandulis stipitatis intermixtis; primocannae foliis quinatis supra glabris subtus fulvo-tomentosis, foliolo terminali late ovato acuminato basi rotundo-cordato, duplicato-dentato; petiolo petiolulisque valde armatis glandulosisque; inflorescentiis racemoso- vel sub-paniculato-corymbiformibus valde armatis; fructibus subglobosis 8 mm. diametro.—New Hampshire: clearings, alluvial terrace of Androscoggin River, Pontook Dam, Dummer, Coös County, September 6, 1917, *Fernald & Pease*, no. 15,649 (type in Herb. Gray.; isotypes in Herb. New Engl. Bot. Cl. and elsewhere).

Rubus sceleratus was so designated by Dr. Ezra Brainerd shortly before his death but, although duplicates of the large series were sent out under that name 30 years ago, I am surprised to find that the name he gave did not get published. The species is the most fiercely armed of any I have ever encountered in the field, comparable only with *R. pugnax* Bailey, Gent. Herb. v. fasc. viii. 524, fig. 235 (1944), which I know only in the herbarium. But, whereas true *R. pugnax* (type-series from Hartland, Connecticut) has the primocane quite glabrous and armed with pale and very broad-based prickles without intermixed glands, *R. sceleratus* has the primocanes densely crowded with stipitate glands, setae and fulvous prickles much more slender than in *R. pugnax*. The inflorescence of *R. pugnax* is similar to that of *R. allegheniensis*, an essentially simple and cylindric

Photo. B. G. Schubert

Rubus alleghenienensis, forma suffultus: fig. 1, portion of fruiting branch, × ½, from type-series.

R. alleghenienensis, var. populifolius: fig. 2, portion of fruiting branch, × ½, from type-series.

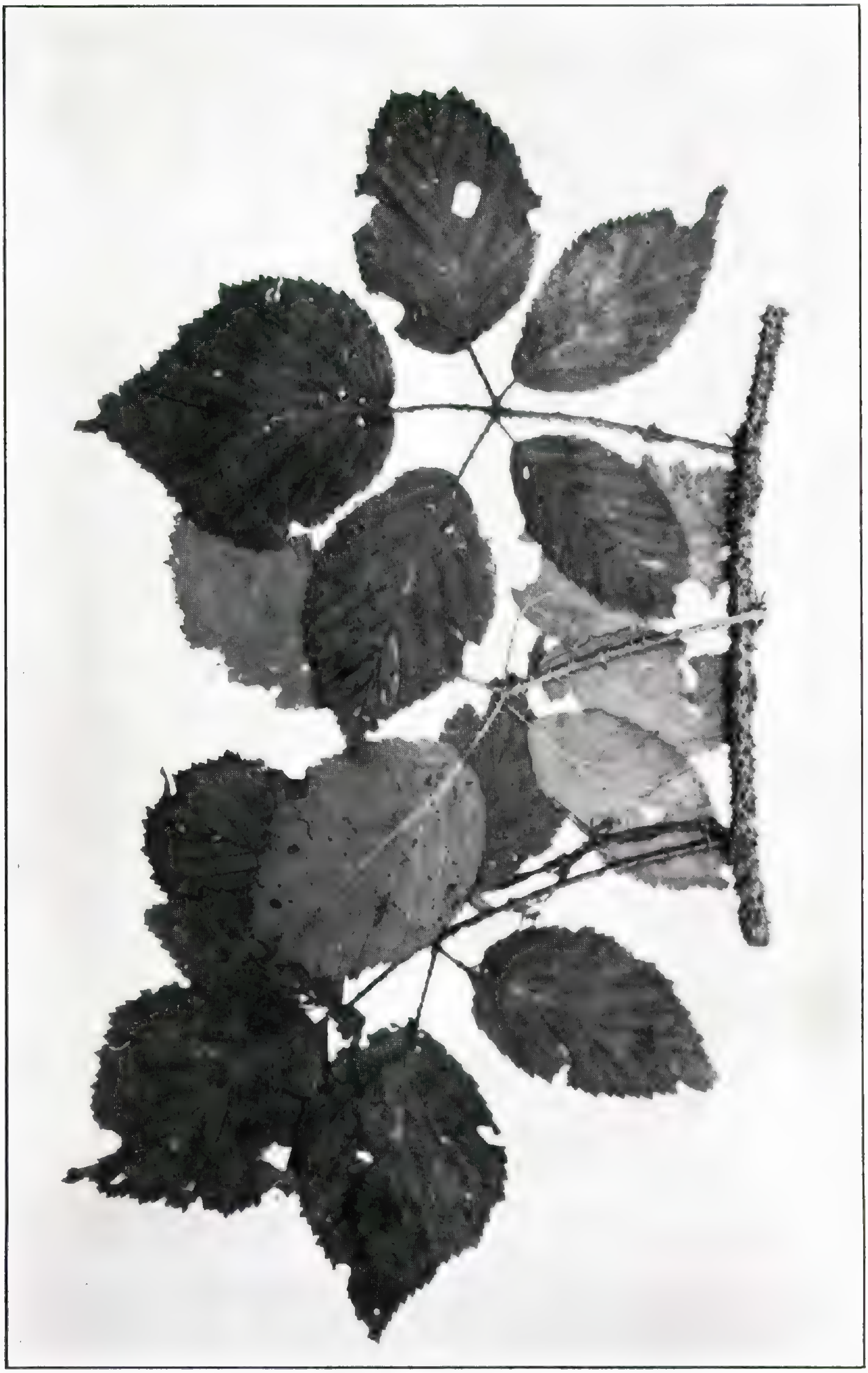


Photo. B. G. Schubert

Rubus sceleratus: small portion of branchlet of primocane, × ⅖, from type-series.

Photo. B. G. Schubert

RUBUS SCELERATUS: small portion of branchlet of floricane, × ⅖, from TYPE-SERIES.

raceme; that of *R. sceleratus* more corymbiform, with the pedicels often changed to forking branches; *i. e.*, it is related to the inclusive *R. glandicaulis* Blanchard. From that common species of southeastern Canada and northern New England it is at once distinguished by the very intricately branching and doming habit, the coarse and crowded prickles of the primocane, the strong armature of petiole and petiolule, the dense tomentum (instead of thin pilosity) of the lower leaf-surface, the spreading (instead of appressed or nearly wanting) pubescence of the nerves of the lower surface and the armed inflorescence.

At the big dam at Dummer *Rubus sceleratus* covered a very extensive area of recently burned clearing. While Pease and I were vainly struggling to secure some representative pieces without tearing to shreds the entrapped foliage (a nearly impossible task; note the illustrations), the keeper of the dam came to express his wonder at our performance and the hope that we would destroy several acres of the pest. Asked what kind of bramble he called it, his feelings were promptly indicated by his reply: "It's a damn nuisance!" Whereupon Pease and I, further struggling to get specimens without too seriously lacerating ourselves, composed a tentative name from Dummerdam and the conventional ending, *ensis*. Sending material to the Reverend Doctor Brainerd, who was then deep in his study of the genus, I received a letter, stating that the name we had used was a bad hybrid of profane English and Latin and that he was calling it *R. sceleratus*. He won but he did not find the opportunity to publish his milder profanity.

2. Rhizome-characters in and minor Forms of Viola

(Plates 1133–1136)

In studying the genus *Viola* as it occurs in eastern North America several cases have been noted where the plants with vernal petaliferous flowers would seem to indicate the need of uniting what have generally or often been considered distinct species. In view, however, of the prolonged and very painstaking study, reinforced by cultivation of and experimentation with our species and their hybrids by the late Ezra Brainerd, I, naturally, hesitated to make hasty and less considered changes. In seeking for characters not generally used but which, in care-

fully collected material, seem very real, I have turned to the vegetative reproduction and the rhizomes, features which in some other groups have been found to be quite stable. One of the cases in which the striking differences in the rhizome are already recognized is that of the eastern *V. canadensis* L., of rich mesophytic and deciduous forest of southeastern Canada and the eastern states, and the Cordilleran and mid-western *V. rugulosa* Greene, which in Wisconsin and Minnesota meets the generally more eastern plants (in Wisconsin, Dr. Fassett informs me, often characterizing shaded bluffs of Niagara limestone, rather than the more typical mesophytic forests). Very slight differences in outline of leaf and degree of scariousness of stipules have been noted but these are rather evasive and difficult to define. When, however, the subterranean parts are carefully dug it is found that the eastern *V. canadensis* is non-stoloniferous and with a stout rhizome (PLATE 1133, FIG. 1) and thick crown; whereas the western *V. rugulosa* spreads by slender, flexuous and freely forking subterranean stoloniform rhizomes (FIG. 2), these setting new crowns at their tips. So long as people are satisfied to snatch the plants without carefully digging the subterranean parts they will struggle to make out the differences. In fact Greene, describing *V. rugulosa* from Minnesota, without mention of stolons, followed it by the stoloniferous *V. Rydbergii*, the Rocky Mountain plant *with* slender stolons. Carefully made collections from the type-station in Minnesota of *V. rugulosa*, however, show the long and flexuous stolons of *V. Rydbergii.*

The very definite *Viola tripartita* Ell. is in its typical form at once distinguished from *V. hastata* Michx. by having the lower leaves of the foliaceous summit sharply divided into long narrow segments or lobes, but the later leaves are uncleft and suggest those of *V. hastata*. To increase the difficulty, there is an extreme form of *V. tripartita* with all the leaves uncleft, this form, forma *glaberrima*[1], so much simulating *V. hastata* that I find

[1] VIOLA TRIPARTITA Ell., forma **glaberrima** (Chapm.), stat. nov. *V. hastata* Michx., β.? DC. Prodr. i. 300 (1824)—without name, although by Harper said to have been called "var. *glaberrima* Ging.". *V. hastata*, var. *glaberrima* [wrongly ascribed to Ging.] Chapman, Fl. So. U. S. ed. 3: 34 (1897). *V. tripartita glaberrima* Harper in Bull. Torr. Bot. Cl. xxvii. 337 (1900). The citation of Gingins as the basic author seems to be erroneous. In DeCandolle's Prodromus, A. P. DeCandolle prepared the treatment except in cases where Gingins was actually cited.

nearly a quarter of the specimens of the two in the Gray Herbarium originally misidentified. Dr. Roland Harper has pointed out that in *V. hastata* the young leaves are flat, those of *V. tripartita* plicate, but that this difference does not show in pressed specimens. If, however, one has carefully collected material the rhizomes make the differentiation simple: the rhizome of *V. tripartita* and its forma *glaberrima* (PLATE 1133, FIG. 3) is subligneous, blackish and densely covered with long fibrous roots; that of *V. hastata* (FIG. 4) fleshy, whitish, coarsely toothed and subtuberous, strongly simulating the rhizome of *Dentaria* or of *Medeola*. Had the earlier authors noted the very different rhizomes they would hardly have united the two species.

The last cases to be noted here are in the usually recognized stoloniferous series. So long as the circumpolar *Viola palustris* L. has violet corollas and stays in alpine and subalpine ravines the flowering plants are quickly distinguished from those of the smaller-flowered *V. pallens* (Banks) Brainerd. There is no difficulty in distinguishing fruiting material, since the grayish seeds of *V. palustris* are 1.5–1.7 mm. long and a full mm. thick, the blackish seeds of *V. pallens* 1–1.4 mm. long and only 0.7–0.8 mm. thick. The trouble is with flowering material of *V. palustris*, forma *albiflora* Neum., which is found in subalpine ravines of Newfoundland. Both plants have deliciously fragrant vernal flowers and the difference in size is trifling. However, when properly collected *V. palustris* shows stiff and cord-like stolons 1–1.5 mm. thick, *V. pallens* having the stolons slenderly thread-like and flexuous. If the former is merely grabbed the crucial character will be missed.

Some acute field-botanists have asserted that, after all, *V. lanceolata* L. and *V. primulifolia* L. are merely leaf-variations of a single polymorphous species. Had they closely watched their growth-habit after the vernal flowering they would have seen a pretty striking difference. In *V. lanceolata*, very soon after the vernal flowering, the rhizome or crown sends out leafy prostrate stolons bearing cleistogamous flowers. By midsummer these highly fruitful leafy stolons form mats (PLATE 1134, FIG. 1) and by late autumn one finds extensive and close carpets with abundant dehiscing capsules. This character was clearly described more than a century ago, when Torrey & Gray (Fl. N. Am. i. 139

(1838)) wrote: "Rhizoma creeping; often bearing very long creeping stolons with an apetalous flower on a short peduncle at each joint". Of the hundreds of collections of *V. lanceolata* before me essentially all which show plants past vernal flowering exhibit the floriferous and leafy stolons.

In *Viola primulifolia*, however, it is a very exceptional plant which shows many or any cleistogamous flowers on the stolons; and up to midsummer the very long and freely forking stolons remain leafless or essentially so, the cleistogamous flowers being on erect and prolonged peduncles borne chiefly from the crowns or from the first nodes of the stolons (PLATE 1135, FIG. 1).[1] Much later in the season, in September and October, the stolons may bear well developed leaves but no (or very exceptional) short-stalked cleistogenes. This final production of leaves on the stolons, which eventually end in new crowns, and the absence of cleistogenes except from the crowns, is well displayed in an isotype (*Harper*, no. 1675, from near Moultrie, Georgia, coll. September 25, 1902) of *V. reptabunda* Greene, Leaflets, ii. 94 (1910), our PLATE 1135, FIGS. 2 and 3. Such autumnal development of leaves on the stolons is shown in many specimens of typical cordate- or subcordate-leaved *V. primulifolia*[2] and its north-ranging var. *acuta*.

The last of these plants to consider is *Viola vittata* Greene, Pittonia, iii. 258 (1898) or *V. lanceolata* L., var. *vittata* (Greene) Weath. & Grisc. in Rhodora, xxxvi. 48 (1934), a plant of the

[1] The specimen from which this figure was made (*Fernald & Long*, no. 21,925 from Arcadia, Nova Scotia, July 29, 1920) is of *V. primulifolia*, var. *acuta* (Bigelow) Torr. & Gray, l. c. (1838), this based on *V. acuta* Bigelow, Fl. Bost. ed. 2: 95 (1824), which came from "Cambridge [Mass.], particularly about the pine trees on Craigie's road [now Brattle Street], in moderately damp soil". Edward Tuckerman deposited in the Gray Herbarium material which he marked as identical with Bigelow's plant, adding that Bigelow had sent him specimens from the original station. The latter locality, "the pine trees on Craigie's road", was apparently the wet depression beneath large white pines between Brattle and Craigie Streets, which was still conspicuous when the present writer came to Cambridge in 1891.

[2] When *V. primulifolia*, forma *subcordata* Griscom in Rhodora, xxxviii. 50 (1936) was defined: "Foliis maioribus subcordatis vel rariore cordatis, saepe crassioris vel rugosis", growing from Florida "North along the coast to southeastern Maryland", the Linnaean account of typical *V. primulifolia* was apparently not given sufficient weight: "foliis oblongis subcordatis" followed by "*Folia cordata, oblonga, obtusissima, crenata, basi decurrentia per petiolum, omnino ut in Primula officinali.*". Typical *V. primulifolia*, with cordate to subcordate leaves, extends northward on the Coastal Plain to New Jersey and inland from the Gulf to Oklahoma. Var. *acuta*, with blades not cordate, reaches Nova Scotia, New Brunswick, central Maine, southern Quebec, southern Ontario, Michigan and Minnesota.

southern Coastal Plain, extending north to southern New Jersey and inland to Coffee County, Tennessee. At vernal flowering the leaves and flowers are often indistinguishable from those of typical *V. lanceolata* but as the season advances the new leaves are greatly prolonged and narrow, with lance-linear blades 0.6–3 dm. long, their margins often (but not always) more denticulate, the peduncles relatively high. However, the evident transition in foliage induced Weatherby & Griscom to treat it as a variety of *V. lanceolata*, a course which Alphonso Wood had indicated on the label of a Georgia specimen from Professor William T. Feay more than 80 years ago (Wood's manuscript name not published). In southeastern Virginia the few known colonies of *V. vittata* (or var. *vittata*) show none of the leafy superficial stolons with axillary cleistogenes which characterize typical *V. lanceolata* (PLATE 1134, FIG. 1). Instead, the plant spreads by slender cord-like subterranean rhizomes which at their tips set new leafy crowns (PLATE 1134, FIG. 2). Since, however, the plant is more abundant southward I have asked for and received the loan of the material in the Britton Herbarium of the New York Botanical Garden for which I am very thankful. This series and that of the Gray Herbarium, although often duplicating one another, are mutually very helpful, for the latter series contains material from three southern states not represented in the former. Furthermore, while the rhizome-character receives much confirmation, the presence of superficial flowering stolons is apparent in several plants which, in their very prolonged leaves, are otherwise good *V. vittata*. Of the 77 specimens studied a few are so carelessly collected as to give no evidence, but 43 clearly show the subterranean rhizome and no superficial stolons, while 12 collections as clearly show the superficial leafy stolons, some of them bearing axillary cleistogenes as in typical *V. lanceolata*. Among these superficially stoloniferous plants may be cited *Small*, no. 8710 from Indian River, Coco, Florida; *Tracy*, no. 5006 from Biloxi, Mississippi; and *Brainerd*, no. 179, raised from Biloxi roots. Such plants as these seem to indicate that, in spite of the great length of the leaves and the generally non-stoloniferous habit, *V. vittata* is perhaps better considered a well defined southern variety of the more widely dispersed and usually shorter-leaved *V. lanceolata*. Such transitional material sug-

gests the need of also watching closely the behavior of *V. canadensis* (plate 1133, fig. 1) and *V. rugulosa* (fig. 2).

The following minor forms may be noted:

V. pedata L., var. linearloba DC., forma **ranunculifolia** (Juss.), stat. nov. *V. ranunculifolia* Juss. ex Poir. Encycl. viii. 626 (1808). *V. pedata*, γ. *ranunculifolia* (Juss.) Gingins ex DC. Prodr. i. 291 (1824) as to source of name, not as to plant described.

Forma *ranunculifolia* (see plate 1136, figs. 1 and 2) occurs rather rarely through much of the range of typical var. *lineariloba;* specimens before me from Massachusetts, Rhode Island, North Carolina, South Carolina and Georgia. A leaf and a flower from Jussieu's type are shown in plate 1136, figs. 1 and 2. Although the name, used in varietal rank by Gingins in DeCandolle's Prodromus, was taken over directly from Jussieu, the plant he had before him in the Prodromus herbarium of DeCandolle belonged to the next form.

V. pedata L., var. lineariloba DC., forma **cuneatiloba** Brainerd in herb., f. nov. (tab. 1136, fig. 3), segmentis foliorum cuneato-obovatis leviter incisis.—Type from 3000 ft. alt., Kate's Mountain, near White Sulphur Springs, Greenbrier Co., West Virginia, May 16, 1892, *J. K. Small* in Herb. Gray.

The type and another sheet in the Gray Herbarium bear Brainerd's annotation-labels. These and several others bear a later unpublished combination. Some sheets have Brainerd's intimation that these plants with broadly cuneate and but slightly cleft leaf-segments are specimens with autumnal foliage. This annotation appears beside a plant from Woburn, Massachusetts, with flowers expanded; all other specimens of this form are indicated as collected in May or show expanded flowers. Not only do these sheets bear unpublished annotations. Most of the sheets of forma *cuneatiloba* bear an unpublished combination by Brainerd with a basonym which was published later than Jussieu's name. Similar annotations are presumably in other herbaria.

V. fimbriatula Sm. forma **umbelliflora,** f. nov. (tab. 1136, fig. 4), pedunculis trifloris, floribus subumbellatis; foliis basin versus valde incisis. Type from Halifax, Nova Scotia, July 20, 1912, *J. Richard Lunt* in Herb. Gray.

Forma *umbelliflora* is an extraordinary departure from the common and typical *Viola fimbriatula*, for the latter, like all the

Photo. B. G. Schubert

Rhizomes of Viola, × 1: fig. 1, V. canadensis; fig. 2, V. rugulosa; fig. 3, V. tripartita, forma glaberrima; fig. 4, V. hastata.

Photo. B. G. Schubert

RHIZOMES OF VIOLA, × 1: FIG. 1, V. LANCEOLATA; FIG. 2, V. LANCEOLATA, var. VITTATA (*V. vittata*).

Photo. B. G. Schubert

Rhizomes of Viola primulifolia, × 1: fig. 1, var. acuta from Nova Scotia; figs. 2 and 3, typical plant from Georgia (isotype of *V. reptabunda* Greene).

Photo. B. G. Schubert

TYPES IN VIOLA, all figs. × 1: FIGS. 1 and 2, V. PEDATA, var. LINEARILOBA, forma RANUNCULIFOLIA; FIG. 3, forma CUNEATILOBA; FIG. 4, V. FIMBRIATULA, forma UMBELLIFLORA.

species of the *Cucullata* group of *Viola*, has single-flowered peduncles. Unfortunately Mr. Lunt did not record more explicitly than Halifax, the locality; but here is a plant which should be sought by Nova Scotians.[1]

V. ADUNCA Sm., var. **minor** (Hook.), comb. nov. *V. Muhlenbergiana*, β. *minor* Hook. Fl. Bor.-Am. i. 78 (1830). *V. labradorica* Schrank in Denkschr. Bot. Ges. Regensb. i^2. 12 (1818). *V. adunca*, var. *glabra* Brainerd in RHODORA, xv. 109 (1913). *V. adunca*, forma *glabra* (Brainerd) G. N. Jones in Univ. Wash. Publ. Biol. v. 194 (1936).

In taking up var. *minor* for the glabrous and commonly more boreal or subalpine extreme of *Viola adunca* the earliest varietal name is revived. Hooker's variety was based on citations of plants of various authors under the name *V. debilis* Pursh, not Michx., including the Richardson material. A specimen of the latter labelled *V. debilis* by Richardson himself is the same as var. *glabra* of Brainerd. I have sought in vain for any character to hold the latter apart from *V. labradorica*. The var. *minor* (or *glabra*) in eastern North America extends 900 miles farther north than typical puberulent *V. adunca;* and at its southern limit in the East it ascends into alpine areas, typical *V. adunca* in the East never doing so.

EXPLANATION OF PLATES 1133–1136

PLATE 1133, RHIZOMES OF VIOLA: FIG. 1, V. CANADENSIS L., × 1, from Hudson Falls, Washington Co., New York, May 24, 1918, *House;* FIG. 2, V. RUGULOSA Greene (*V. Rydbergii* Greene), × 1, originally from Boulder, Colorado, transplanted to Middlebury, Vermont, and distrib. in Brainerd's Violets of E. N. Am., no. 138; FIG. 3, V. TRIPARTITA Ell., forma GLABERRIMA (Chapm.) Fern., × 1, from north of Fort Payne, DeKalb Co., Alabama, *Svenson*, no. 7701, as *V. hastata;* FIG. 4, two rhizomes, × 1, of V. HASTATA Michx. from Tallulah Falls, Georgia, *Perry & Strahan*, no. 948.

PLATE 1134, RHIZOMES OF VIOLA: FIG. 1, V. LANCEOLATA L., × 1, from Bridgewater, Nova Scotia, *Fernald & Long*, no. 24,180; FIG. 2, V. LANCEOLATA, var. VITTATA (Greene) Weath. & Grisc. (*V. vittata* Greene), × 1, from Whitefield's Millpond, southwest of Corinth, Southampton Co., Virginia, *Fernald & Long*, no. 14,368.

PLATE 1135, RHIZOMES OF VIOLA: FIG. 1, V. PRIMULIFOLIA L., var. ACUTA (Bigel.) Torr. & Gray, × 1, from Arcadia, Nova Scotia, *Fernald & Long*, no. 21,925; FIGS. 2 and 3, typical V. PRIMULIFOLIA, from ISOTYPE of *V. reptabunda* Greene, × 1, from near Moultrie, Colquitt Co., Georgia, *Harper*, no. 1675.

PLATE 1136: FIGS. 1 and 2, leaf and flower of TYPE, × ½, of VIOLA PEDATA L., var. LINEARILOBA DC., forma RANUNCULIFOLIA (Juss.) Fern. (*V. ranunculifolia* Juss.); FIG. 3, portion of TYPE, × 1, of V. PEDATA, var. LINEARILOBA, forma CUNEATILOBA Brainerd; FIG. 4, portion of TYPE, × 1, of V. FIMBRIATULA Sm., forma UMBELLIFLORA Fern.

[1] On the same trip Mr. Lunt, on July 18, collected *Calamagrostis cinnoides* (Muhl.) Bart., the locality given simply as Halifax, this the first evidence of the species from east of York County, Maine.

To be continued

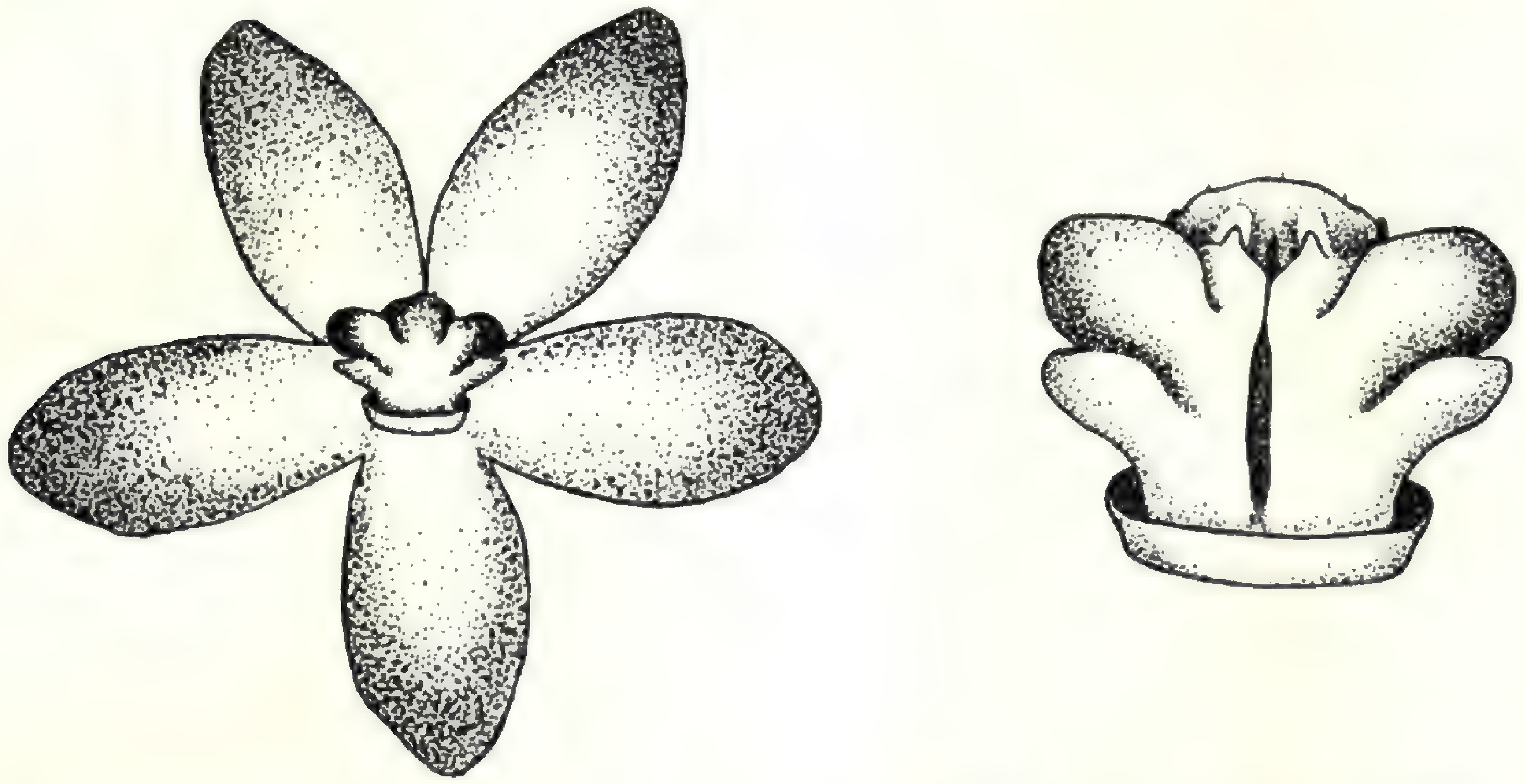
A NEW SPECIES OF SARCOSTEMMA FROM OKLAHOMA

U. T. WATERFALL[1]

A COLLECTION of *Sarcostemma* was made by the author in the Black Mesa Area of the Oklahoma panhandle in June, 1948. It appeared possibly referable to *S. heterophylla* which it resembled in having peduncles longer than the pedicels, and plane leaves. However that species has flowers about 8 or 9 mm. in diameter[2], and the corolla-lobes have fimbriate margins.[3] The Black Mesa *Sarcostemma* has larger flowers, about 17–20 mm. in diameter, and the margins are smooth. The corollas, with their oblong, obtuse lobes which are glabrous internally and sparsely short-pubescent externally, more nearly resemble those of *S. crispum.* However the latter species has flowers about 12–13 mm. in diameter, the corolla-lobes are ciliolate, the peduncles and pedicels are often about equal in length, and the leaf-margins are usually crisped. The species from the Black Mesa is further characterized by having laterally bilobed coronal vesicles, a distinguishing feature found in neither of the other species with which it might be confused. Believing this to be a distinct species, the author is describing it under *Sarcostemma* in accordance with Woodson's conclusions[4] regarding the inadvisability of attempting to maintain *Funastrum* and *Philibertia.* If the two be retained as distinct genera, the present species would obviously fall in *Funastrum.*

SARCOSTEMMA **lobata,** sp. nov. Caules volubiles, sparse recurvato-puberuli; folia sparse puberula, anguste linearia (4–10 cm. longa, 0.5–2.0 cm. lata ad basim), laminae basibus auriculato-hastatis vel auriculato-cordatis vel obtusis, petiolis 5–10 mm. longis; pedunculi 3–6 cm. longi, 2- vel 5-flori, pedicellis 1–2 cm. longis; sepala linearia vel lineari-lanceolata; flores 17–20 mm. diametro, petalis extrorsum sparse puberulis introrsum glabris, oblongis vel ovato-oblongis obtusis, 8–10 mm. longis 4 mm. latis, annulis 0.5–0.7 mm. altis, coronae segmentis lobatis.

[1] Botanist, Oklahoma Biological Survey.
[2] Torrey, John. *Bot. Mex. Bound.* 161. 1858.
[3] Torrey, John. *U. S. Rep. Explor. Miss. Pacif.* 5: 362. 1858.
[4] Woodson, Robt. E. *North American Asclepiadaceae. I.* Ann. Mo. Bot. Gard. 28: 216–217. 1941.



SARCOSTEMMA LOBATA: FIG. 1 (left), open flower from the TYPE, actual diameter 2 cm.; FIG. 2 (right), gynostegium, actual diameter 2 mm. Drawings by *Helen Skinner*.

The TYPE is: *Waterfall* 7914, collected from sand around white sandstone north of the Black Mesa, three miles north and one-half mile west of Kenton, Cimarron County, June 13, 1948. It is in the Bebb Herbarium of the University of Oklahoma. ISOTYPES are in the Gray Herbarium, and the herbaria of the Missouri and New York Botanical Gardens. Growing with the type collection of *Sarcostemma lobata* were *Asclepias macrotis*, *Oryzopsis hymenoides*, and a *Physalis* sp., possibly *P. Fendleri*. *Sarcostemma lobata* was also collected as *Waterfall* 7928, slopes of buttes six miles south of Kenton, Cimarron County, June 14, 1948.

DEPT. OF PLANT SCIENCES, UNIVERSITY OF OKLAHOMA,
Norman, Oklahoma.

HERBARIUM TECHNIQUE.—Pressed and dried plant material may be softened for dissection by the use of a solution of "Tide." Probably "Vel," "Dreft," or any of the detergents now on the market, would do as well. No particular formula is needed; use perhaps a teaspoon of Tide to a pint of water and stir rather than shake to avoid forming suds. Softening action is practically instantaneous, and material need not be removed from a herbarium sheet as for boiling. This method is particularly

convenient for grasses; just put a drop of Tide solution on a spikelet and dissect. After dissection, excess solution may be soaked up with a cloth or blotter. A small bottle of solution keeps for several months, and eventually molds, but the cost and time for replacement are negligible.

Seeds and other small objects, a millimeter or less in diameter, are most easily picked up by use of a stylus made of a narrow strip of cellulose acetate (safety film), cut to a fine point. Rub the stylus once or twice against the clothes, and it will pick up a small object by static electricity, holding it with such tenacity that it must be pushed off with a needle.—N. C. Fassett, University of Wisconsin.

Diervilla sessilifolia in Virginia.—In August, 1948, while motoring south from Front Royal, Virginia, along the Skyline Drive in the Shenandoah National Park, I left the car after going a few miles and took one of the trails which led out to a rocky promontory on Hogback Mountain in Warren County. Here, overlooking the Shenandoah Valley at an elevation of about 3,000 feet, I found growing in dry rocky soil several bushes of the southern *Diervilla sessilifolia* Buckley. I have seen this frequently farther south in the Blue Ridge mountains of North Carolina but never before in Virginia. Small gives its northern limit as North Carolina and Tennessee and it is not included in the 7th edition of Gray.

Having been found now in the mountains of northwest Virginia, it should be looked for farther south along the Blue Ridge in that State.—Francis Welles Hunnewell, Gray Herbarium.

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CONTENTS:

Contributions from the Gray Herbarium of Harvard University.—No. CLXIX.

Part II. Studies of Eastern American Plants. *M. L. Fernald*
3. Some Varieties in Oenothera. 61
4. Emendations in the Order Tubiflorae. 70

The Status of Hicoria borealis Ashe. *Wayne E. Manning*. 85

Aster ontarionis the same as A. pantotrichus (A. missouriensis). *Lloyd H. Shinners*. 89

Aster coerulescens the same as A. praealtus. *Lloyd H. Shinners*. 91

Chenopodium hybridum, var. Standleyanum. *M. L. Fernald*. ... 92

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Photo. B. G. Schubert

OENOTHERA BIENNIS: FIG. 1, portion of plant naturalized in northwestern Europe, × 1, *Buchenau;* FIG. 2, calyx, × 1, from Magdalen Islands, Quebec; FIG. 3, calyx, × 3, from Massachusetts; FIG. 4, expanded flower, × 1, from Massachusetts; FIG. 5, flower, × 1, from Minnesota; FIG. 6, seeds, × 5, from New Hampshire.

O. BIENNIS, var. NUTANS: FIG. 7, calyx, × 3, from Virginia; FIG. 8, expanded flower, × 1, from Virginia; FIG. 9, expanded flower, × 1, from New York; FIG. 10, seeds, × 5, from Maryland.

Rhodora

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—No. CLXIX.

Part II. STUDIES OF EASTERN AMERICAN PLANTS

M. L. Fernald

(*Continued from page 57*)

3. Some Varieties in Oenothera (Plates 1137–1143)

In studying the true Oenotheras of the "Manual range" I have, unfortunately, been unable to compile from a treatment of the group, such as Dr. Philip A. Munz has so satisfactorily supplied for the other subgenera. The long hoped-for study by him of § *Onagra* is still anxiously awaited. In the meantime the necessity to do something with this most variable and perplexing series (made more perplexing through the evident hybridization of species and the superabundance of vegetative mutants which have been described as "species") has necessitated two weeks of sorting and resorting of many hundreds of collections. It is gratifying to note that the primary distinctions several times emphasized by Wiegand seem to be of fundamental importance. Aside from the cultivated and escaped *O. grandiflora* Ait. (including the very similar *O. grandiflora* Lam. or *O. Lamarckiana* Ser.) and the Alleghenian *O. argillicola* Mackenzie (seeds shown in plate 1138, fig. 11), we have what seem like three primary species, with fairly definite characters in habit, calyx and seeds. These technical but seemingly well established characters are shown in the plates prepared with her usual care by Dr. Schubert.

I am taking up *O. biennis* in the long-accepted sense, although much argument has been published, to the effect that something which had long been cultivated in Europe, and which had

spread to the open in northwestern continental Europe, cannot be matched with anything American. Before me, however, is a photograph of a plant which Linnaeus described in Hortus Cliffortianus, marked by him "*biennis*", which shows the distant, thin and spreading-ascending leaves, the tips of the calyx-lobes united at base into a definite tube and other characters which strikingly suggest *O. biennis* as interpreted by Robinson & Fernald and by Wiegand. A specimen in the Linnaean Herbarium (no. 484.1), which Linnaeus had before him in preparing ed. 1 of Species Plantarum, is also characteristic of the species as understood (very like the Hort. Cliff. specimen). Furthermore, specimens from various parts of Europe are the same; thus, material growing on dunes of the Ostfriesisch Inseln and sent by the late Professor Buchenau as *O. muricata* L. is partly of that plant, partly (our PLATE 1137, FIG. 1) of *O. biennis*.

O. biennis, then, has the membranaceous leaves minutely soft-pilose beneath, lanceolate to lance-oblong or sometimes oblong-ovate; the bracts of the inflorescence (except in one local var.) shorter and finally deciduous, leaving a naked fruiting spike; the calyx-lobes in the unexpanded buds with the slender tips closely connivent or parallel at base, thus forming a tube (PLATE 1137, FIGS. 1–4 and PLATE 1138, FIGS. 1–3, 7 and 9); the expanded and reflexed calyx-lobes (PLATE 1137, FIGS. 4, 5, 8 and 9, and PLATE 1138, FIGS. 5 and 8) 1–2.5 cm. long and arching or extending straight back (not deflected by the auricle). The fully mature seeds are 1.2–1.8 (–2) mm. long and 0.6–1.2 mm. broad, their angles (under magnification) with very narrow wings (PLATE 1137, FIGS. 6 and 10, and PLATE 1138, FIGS. 6 and 10). This collective species has four well defined geographic varieties. Typical *O. biennis* (PLATE 1137, FIGS. 1–6) or var. *vulgaris* Torr. & Gray, has the surfaces of the calyx, ovaries and capsules evident, and more or less villous, or the capsules merely hirsute and 1.5–3.5 cm. long. It is wide-ranging in dry soil from Newfoundland and the Côte Nord of Quebec to southeastern Alberta (local west of Manitoba), south to Nova Scotia, New England, Long Island, northern Florida, Tennessee, Arkansas, North Dakota and Idaho. Among minor trends are *O. comosa, grandifolia, Hazelae, novae-scotiae, parva* and *Royfraseri* R. R. Gates and *O. Victorini* Gates & Catcheside.

Very similar but with the often viscid body of the calyx (PLATE 1137, FIGS. 7–10) glabrous or essentially so, the glabrescent capsules only 1–2.5 cm. long, is var. *nutans* (Atkinson & Bartlett[1]) Wiegand in RHODORA, xxvi. 3 (1924), based on *O. nutans* Atkinson & Bartlett in Science, n. s. xxxvii. 717 (1913) and RHODORA, xv. 83 (1913), ranging from New York to Georgia.

The other two most significant varieties have firmer and strongly ascending leaves. Their calyx-lobes, ovaries and capsules have the surfaces hidden by dense canescent or whitish pubescence. Var. *canescens* Torr. & Gray, Fl. N. Am. i. 492 (1840) (our PLATE 1138, FIGS. 1–6) has the pubescence of calyx and capsule of closely appressed and short strigae. It ranges from southern Quebec to southeastern Alberta, south to the coast of eastern New Brunswick, western New York, southern Ontario, Ohio, Illinois, Missouri and Oklahoma, being primarily a variety of the prairies. It includes *O. canovirens* Steele and *O. eriensis, niagarensis* and *repandodentata* R. R. Gates and passes insensibly into var. *hirsutissima* Gray in Mem. Am. Acad., n. s. iv[1]. (Pl. Fendl.) 43 (1849) and in Pl. Wright. i. 69 (1852), our PLATE 1138, FIGS. 7–10. Var. *hirsutissima* has the pubescence of capsule and calyx with many ascending to spreading long villi. Gray defined var. *hirsutissima* in peculiarly bifurcate fashion: in Plantae Fendlerianae (1849), enumerating Fendler's New Mexican plants, he had

> "218. OENOTHERA BIENNIS, var. HIRSUTISSIMA. Valley of Santa Fé Creek, in the mountains; June. Plant 2 to 3 feet high", he completing the description in Plantae Wrightianae three years later: "190. OE. BIENNIS, *Linn.*, var. Along the Limpia.—This is the same strigose-hirsute variety as No. 218, *Pl. Fendl.*, a form which is common in Oregon and along the Rocky Mountains".

This, of course, is the transcontinental plant which was defined as *Onagra strigosa* Rydberg, Mem. N. Y. Bot. Gard. i. 278 (1900) and which was reduced to varietal rank as *Onagra biennis*, var. *strigosa* (Rydb.) Piper in Piper & Beattie, Fl. Palouse Reg. 124 (1901) and transferred to *Oenothera* as *Oenothera strigosa* (Rydb.) Mackenz. & Bush, Man. Fl. Jackson Co., Mo. 139 (1902). The dominant extreme of the species in the cordil-

[1] The citation in Index Londinensis of H. H. Bartlett as "Bartl." is misleading, in view of the long use of that abbreviation for Bartling.

leran region, var. *hirsutissima* is found in the East, especially near the coast. Its broad range is from southern Quebec to western British Columbia, south to Prince Edward Island, southern New England, New Jersey, Pennsylvania, Michigan, Illinois, Kansas, Texas, New Mexico, Arizona and northern Mexico.

Just as *Oenothera biennis* has more or less defined geographic varieties with pronounced differences in the density of pubescence of calyx, capsule, etc. but with the same form of calyx-lobes and with small seed with evident thin and narrowly winged angles, so do the other two most common species of the East present somewhat definite varieties along parallel lines. In these two species the calyx has the slender tips not connivent and forming a tube at base; but in the bud they are distinct to base and somewhat distant (PLATE 1139, FIGS. 1 and 2 and 4, 5, 6 and 8, PLATE 1140, FIGS. 1 and 2, PLATE 1141, FIGS. 1–4, and PLATES 1142 and 1143. The auricle at junction of blade and slender tip is rather prominent and in the expanded calyx the tip is somewhat deflected, instead of continuing the direction of the blade, being usually 1–3 (rarely –5) mm. long. In these species the fully developed seeds are plump and larger than in *O. biennis* and filled out to the angles, which lack or nearly lack the evident thin and narrow wing (seen under magnification) of the latter species.

The first of these two is *Oenothera parviflora* L., Syst. ed. 10: 998 (1759) and Sp. Pl. ed. 2: 492 (1762) or *O. muricata* L. Syst. ed. 12: 263 (1767). The first description of Linnaeus was brief and misleading, for the emphasis was placed on a supposed 8-cleft summit of the fruit: "*Margo coronans fructum, non uti praecedentis quadrifidus, sed octofidus est*"; but the full description of 1762 was most satisfactory in saying: "Caulis *pilis adspersus, sed absque tuberculis ad eorum basin* . . . Calyx *tubo* . . . *infra apicem denticulo notatus, hinc ante explicationem mucrones in hac distantes*". The specimen in the Linnaean Herbarium (sheet 484.2) clearly marked by him as "*parviflora*" (photograph, like those of *O. biennis* and *O. muricata*, unfortunately too weak for reproduction) is a flowering one, with the long bracts and perfectly characteristic calyx of the plant identified by Wiegand as *O. parviflora*. Similarly, Linnaeus's type of *O. muricata*

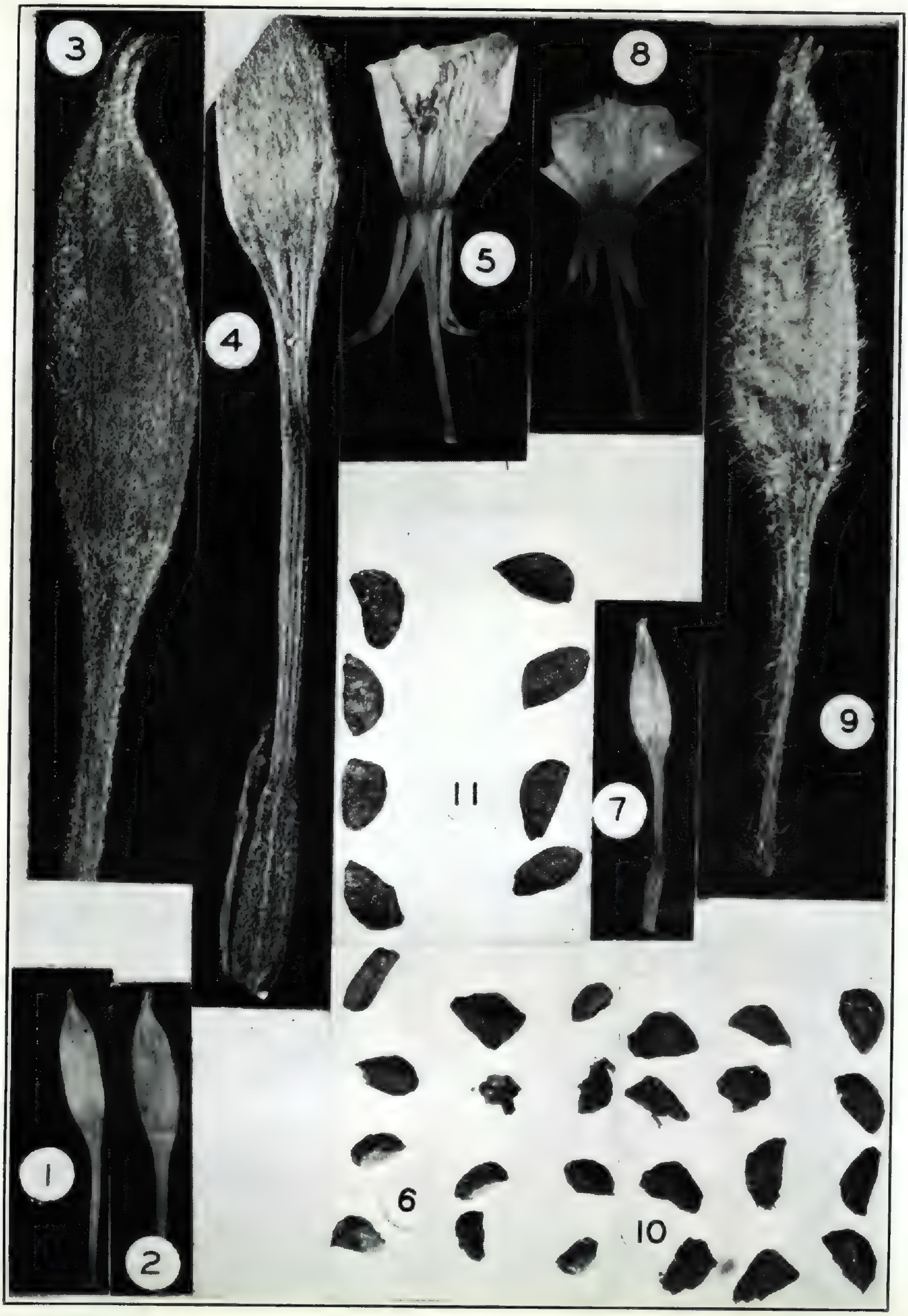

Photo. B. G. Schubert

OENOTHERA BIENNIS, var. CANESCENS: FIG. 1, calyx, × 1, from Saskatchewan; FIG. 2, calyx, × 1, from isotype of *O. canovirens* Steele; FIG. 3, calyx, × 3, from same plant as fig. 2; FIG. 4, ovary and portion of calyx, × 3, from Iowa; FIG. 5, expanded flower, × 1, from Saskatchewan; FIG. 6, seeds, × 5, from Iowa.

O. BIENNIS, var. HIRSUTISSIMA: FIG. 7, calyx, × 1, from Wyoming; FIG. 8, expanded flower, × 1, from Idaho; FIG. 9, calyx, × 3, from Wyoming; FIG. 10, seeds, × 5, from Vancouver Island.

O. ARGILLICOLA: FIG. 11, seeds, × 5, from West Virginia.

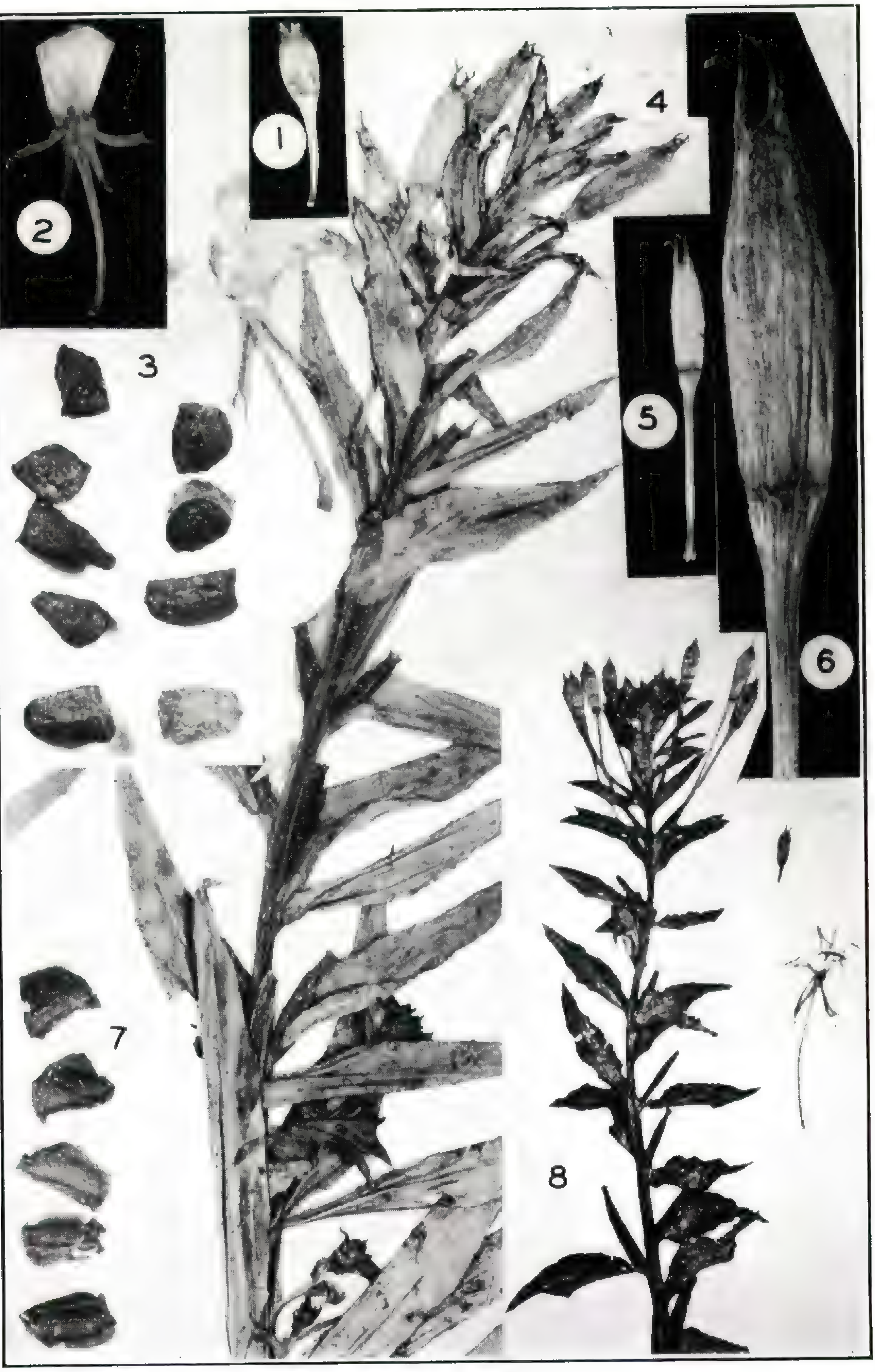

Photo. B. G. Schubert

OENOTHERA PARVIFLORA: FIG. 1, calyx, × 1, from Quebec; FIG. 2, expanded flower, × 1, from Quebec; FIG. 3, seeds, × 5, from Prince Edward Island.

O. PARVIFLORA, var. ANGUSTISSIMA: FIG. 4, summit of plant, × 1, from New York; FIG. 5, calyx, × 1, from same plant as fig. 4; FIG. 6, same calyx, × 3.

O. PARVIFLORA, var. OAKESIANA: FIG. 7, seeds, × 5, from Massachusetts.

O. CRUCIATA: FIG. 8, portion of TYPE, × ca. ½.

Photo. B. G. Schubert

Oenothera parviflora, var. Oakesiana: fig. 1, summit of type of O. Oakesiana Robbins, × 1; fig. 2, bud, × 1, from topotype of *O. Tidestromi;* fig. 3, ovary and portion of calyx, × 3, from same plant as fig. 2.

Photo. B. G. Schubert

Oenothera cruciata: fig. 1, summit of plant, × 1, from New Hampshire; fig. 2, calyx, × 1, from Maine; fig. 3, same calyx, × 3; fig. 4, expanded flower, × 1, from same plant as figs. 2 and 3; fig. 5, capsule, × 1, from New York; fig. 6, same capsule, × 3; **fig. 7, seeds, × 5, from New Hampshire.**

(sheet 484.3) is from an older plant, with well developed capsules subtended by long ascending bracts, the calyx-tips as in the earlier published *O. parviflora*. This is most fortunate, for no change of interpretation is necessitated.

Oenothera parviflora, then, is characterized by its free calyx-tips, with evident auricle which deflects the tip; by its obovate petals; its simple or rarely branching stem 1–8 dm. high; the foliage-leaves passing without obvious change into the bracts, which are prolonged and which persist on the leafy-bracted fruiting spike; and by the large (2–2.6 mm. long, 1–1.8 mm. broad) and plump seeds without any or with scarcely any thin wings.

The typical variety has the upper (often the lower) half of the stem beset with long spreading hairs, often on enlarged reddish pustular bases; the fresh leaves rather fleshy and firm, ascending, strigose to glabrescent beneath; calyx and capsule more or less strigose-villous. It abounds on gravelly shores, talus (often calcareous), sands and dry open soil from Newfoundland and the Côte Nord of Quebec to James Bay and the Thunder Bay District of Ontario, south to Nova Scotia, New England and New York. Var. *angustissima* (R. R. Gates) Wiegand in RHODORA, xxvi. 3 (1924), based on *Oenothera angustissima* R. R. Gates in RHODORA, xv. 46, pl. 100 and 101 (1913), differs in the stem, leaves, calyx and capsule being glabrous or essentially so (our PLATE 1139, FIGS. 4–6), thus paralleling *O. biennis*, var. *nutans* and, like it, chiefly Alleghenian, known from southwestern Quebec to western New York, south to the District of Columbia and West Virginia.

The third variety of *O. parviflora* is the chiefly coastal extreme with close and canescent, minute pubescence on stem, lower leaf-surfaces, backs of calyx-lobes and capsules, *O. Oakesiana* Robbins. This plant, with all the general characters of *O. parviflora* but with the auricle at summit of the calyx-lobes often longer and more conical than in typical *O. parviflora*, had a rather shaky nomenclatural start. Robbins sent a sheet of it (PLATE 1140, FIG. 1) to Asa Gray, with this label:

"*Oenothera Oakesiana*, sp. ined. Robbins
Annua, Oe. bienni minor; pubescentiâ molliore, adpressa; apicibus calycis divergentibus; caps. longiori, acutiori; seminibus majoribus.

Foliis insuper angustioribus, agrestum ad Norton, Mass. in arenosis, cultam ex seminibus ad Apponaug, R. I., lectis Aug., 1865 et legit ad New Haven, Conn., primum 1827."

Gray immediately took it up in his Man. ed. 5: 178 (1867) but as *O. biennis*, "Var. 5. Oakesiàna (OE. Oakesiana, *Robbins*)", Robbins's binomial thus published technically as a synonym. Sereno Watson did not do much better in his *Revision of the extra-tropical North American Species of the Genus Oenothera*, for there, in Proc. Am. Acad. viii. 579 (1873), under an all-inclusive *O. biennis,* he said: "The more strigose form is *OE. muricata*, Murr.; the more softly pubescent is *OE. Oakesiana*", without any author cited. In his Bibliographical Index, 383 (1878), however, the plant came into full recognition as "**OE. Oakesiana.** Robbins, in herb." with the two previously noted publications obscurely cited in the synonymy. But in these and later shifts of the name Robbins's noting of the two most significant characters, "apicibus calycis divergentibus" and "seminibus majoribus", was quite ignored. Robbins understood his plant; those who published it did not! In all its characters, except the cinereous and very fine pubescence, it is inseparable from *O. parviflora*. I am, therefore, calling it

O. parviflora L., var. **Oakesiana** (Robbins), comb. nov. *O. biennis,* var. *Oakesiana* (*O. Oakesiana* Robbins) Gray, Man. ed. 5: 178 (1867). *O. Oakesiana* as a binomial "form" of *O. biennis,* S. Wats. in Proc. Am. Acad. viii. 579 (1873). *O. Oakesiana* Robbins in herb. in S. Wats. Bibl. Index, 383 (1878). *O. Oakesiana* Robbins ex Wats. & Coult. in Gray, Man. ed. 6: 190 (1890). *Onagra Oakesiana* Britton in Mem. Torr. Bot. Cl. v. 233 (1894). *Oe. Tidestromii* Bartlett in Cybele Columb. i. 54, pl. 5 (1914).—Sands along the coast and rarely inland, Plymouth and Worcester Counties, Massachusetts, to Northampton County, Virginia. Plate 1140.

The second species with the tips of the calyx-lobes deflected above the auricle and the seeds plump and relatively large is *O. cruciata* Nutt. in G. Don, Syst. ii. 686 (1832) or *O. biennis,* ε. *cruciata* (Nutt.) Torr. & Gray, Fl. N. Am. i. 492 (1840) (our plate 1139, fig. 8, and plate 1141). Typical *O. cruciata* is habitally much like *O. biennis* and mostly with ascending branches, the cauline leaves membranaceous, acute and distant, leaving long reddish internodes exposed, minutely pilose beneath;

and the bracts quickly fall after the flowering, thus leaving long naked spikes of capsules. In these characters it would go with *O. biennis;* but its calyx-lobes are much as in *O. parviflora,* with tips free in the bud and in the expanded lobes deflected, the petals linear and only 1–3 mm. broad, the longest styles only up to 1.2 cm. long, and the seeds (PLATE 1141, FIG. 7) plump and as large as or larger than in *O. parviflora.* The typical plant, with villous-strigose stem, remote leaves and loosely spreading-villous calyx, is a very characteristic species, especially on gravelly beaches or bars of streams and ponds of a limited area: from southeastern and central Maine to northeastern New York, southward to Middlesex County, Massachusetts, Providence County, Rhode Island, and Hartford County, Connecticut. Quite isolated from the typical plant are two insular departures from it. The first is

O. CRUCIATA Nutt., var. **sabulonensis,** var. nov., TAB. 1142, caulibus 3–3.5 dm. altis simplicibus adpresse canescento-pilosis; foliis oblongis subobtusis plerumque 1.5–2.5 cm. latis subapproximatis subintegris; calycibus sparse minuteque pilosis; capsulis 8–10 mm. crassis laxe villosis.—NOVA SCOTIA: Sable Island, July 24, 1899, *John Macoun,* no. 21,193; edge of gully in sand-dunes, Sable Island, August 18, 1913, *St. John,* no. 1283 (TYPE in Herb. Gray.).

Var. *sabulonensis,* isolated by 300 miles from the eastern limit of typical *Oenothera cruciata* and with a stretch of 100 miles of sea separating it from the mainland, differs at once from the latter plant in its simple and low stems only 3–3.5 dm. high (in typical *O. cruciata* mostly branching and up to 1 m. high), approximate, instead of distant leaves, these bluntish, oblong and subentire (in typical *O. cruciata* lanceolate, acute and repand-denticulate); calyx minutely and sparsely pilose, instead of villous; capsule 8–10, instead of 5–7 mm. thick. Further material, especially with plenty of flowers and mature seeds, may show other departures.

On the islands of Nantucket and Martha's Vineyard, like Sable Island isolated remnants of the Cretaceous and Tertiary Coastal Plain, *Oenothera cruciata* is represented by

O. CRUCIATA Nutt., var. **stenopetala** (Bicknell), stat. nov., our PLATE 1143. *O. stenopetala* Bicknell in Bull. Torr. Bot. Cl. xli. 79 (1914).

Var. *stenopetala*, described in great detail by Bicknell, was considered by him to have "its real affinity . . . not with *O. cruciata*, a near-relative of *O. biennis*, but rather with *O. Oakesiana* with which it agrees closely in pubescence and to some extent in the form of the capsule". Perhaps so, but Bicknell's characterization of *O. cruciata* shows considerable unfamiliarity with that plant. His "bracts subtending the flowers [in *O. cruciata*] are broad based, not narrowly tapering or petiolulate" is unfortunate in view of the bracts of *O. cruciata* (summit of Nuttall's type in PLATE 1139, FIG. 8). The very narrow petals and the tendency to elongate branching (ISOTYPE in PLATE 1143, FIG. 1) seem to me to ally *O. stenopetala* with *O. cruciata*, but the question is far from settled. The plant is distinguished by its slender stem cinereous with crowded minute appressed pubescence; narrowly lanceolate or oblanceolate acute and repand-denticulate firm leaves only 0.4–1.5 cm. broad, these closely cinereous-strigose beneath; calyx and capsule similarly cinereous. As already noted, its status is still not wholly clear. It is an *Oenothera!*

O. TETRAGONA Roth, var. **hybrida** (Michx.), comb. nov. *O. hybrida* Michx. Fl. Bor.-Am. i. 225 (1803). *Kneiffia tetragona*, var. *hybrida* (Michx.) Pennell in Bull. Torr. Bot. Cl. xlvi. 371 (1919). *O. tetragona*, var. *Fraseri* (Pursh) Munz, forma *hybrida* (Michx.) Munz in Bull. Torr. Bot. Cl. lxiv. 300 (1937).

O. TETRAGONA, var. **latifolia** (Rydb.), stat. nov. *Kneiffia latifolia* Rydb. in Torreya, xxvii. 86, pl. 3 (1927). *O. tetragona*, var. *Fraseri*, forma *latifolia* (Rydberg) Munz, l. c. 301 (1937).

Although Munz treats these two plants as mere forms of *Oenothera tetragona*, var. *Fraseri* (based on *O. Fraseri* Pursh, Fl. Am. Sept. ii. 734 (1814)), the first "Like var. *Fraseri* but with spreading hair on stems, leaf-veins, etc.", the second "Like var. *Fraseri*, but finely strigose", the differences seem to me more than direction and abundance of trichomes. *O. Fraseri* is glabrous throughout, apparently inseparable from *O. glauca* Michaux, Fl. Bor.-Am. i. 224 (1803), a photograph of the type before me; *O. Fraseri* (at least plants raised from Fraser's seeds) illustrated in Bot. Mag. xl. t. 1674 (1814), with citation of Pursh's description. *O. glauca* was well illustrated in Bot. Mag. xxxix. t. 1606 (1814). Not only is var. *Fraseri* glabrous; its oval to broadly ovate leaves are mostly 2–4 cm. broad, with only

Photo. B. G. Schubert

Oenothera cruciata, var. sabulonensis, all figs. from type: fig. 1, upper half of plant, × 1; fig. 2, bud, × 1; fig. 3, same bud, × 3.

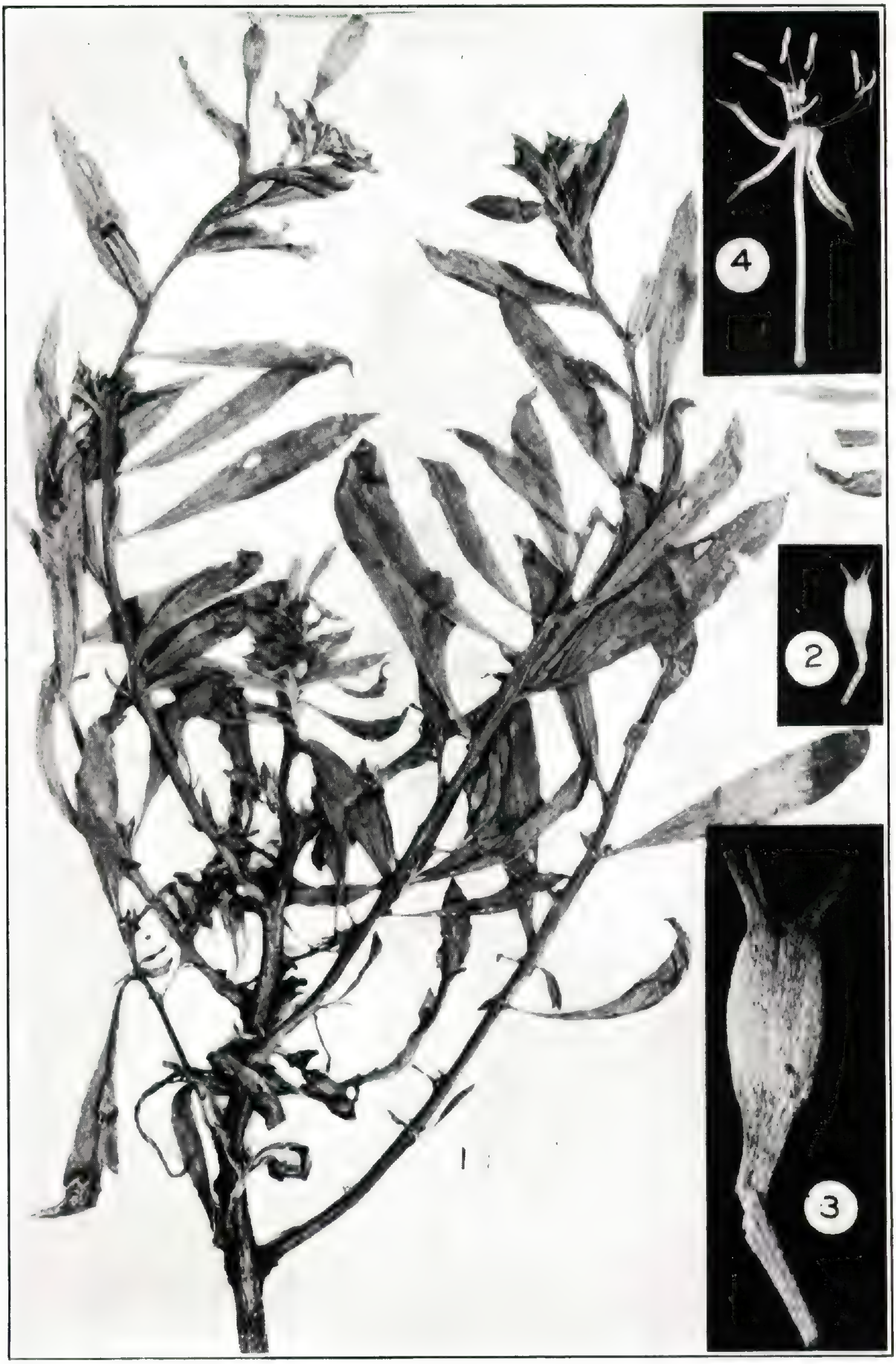

Photo. B. G. Schubert

OENOTHERA CRUCIATA, var. STENOPETALA: FIG. 1, isotype, × 1, of *O. stenopetala* Bicknell; FIG. 2, calyx, × 1, FIG. 3, calyx, × 3, and FIG. 4, expanded flower, × 1, all from type-region, Nantucket Island, Massachusetts.

1–3 (rarely –4) low dentations per 2 cm. of margin, the leaves usually not subtending axillary fascicles; its petals 2–3 cm. long. It seems to be restricted to uplands of Virginia, West Virginia, possibly Ohio (Michaux's label of *O. glauca* reading: "Ouest de Ohio Route aux Illinois") and south along the mountains into western North Carolina and eastern Tennessee.

Vars. *hybrida* and *latifolia*, on the other hand, are both usually pubescent and both have lanceolate to narrowly lance-ovate leaves, the largest ones only 1–2 cm. broad (in the types of both 1 cm. broad), and their margins have 4–6 teeth per 2 cm.; in practically all specimens suppressed axillary branches or fascicles are abundant, and the petals may be as short as 1 cm. (not with a minimum of 2.5 cm.). Var. *hybrida*, characterized by spreading pubescence on stem, leaves, calyx and capsule, extends from the upland of Tennessee and North Carolina out to the inner margin of the Coastal Plain of Virginia. Var. *latifolia* extends from the mountains of eastern Tennessee and western North Carolina north into eastern West Virginia, northern Virginia (Clarke Co.) and southern Pennsylvania (Fayette and York Cos.). With narrower leaves, abundant axillary fascicles, development of pubescence, usually smaller petals and wider ranges eastward or northward, they are not satisfactorily treated as merely pubescent forms of var. *Fraseri*.

Explanation of Plates 1137–1142

Plate 1137. Oenothera biennis L.: fig. 1, portion of plant, × 1, from dunes of the Ostfriesische Inseln, August 12, 1900, *Buchenau;* fig. 2, calyx, × 1, from Ile de Brion, Magdalen Islands, Quebec, *St. John*, no. 1937; fig. 3, calyx, × 3, from Sheffield, Massachusetts, June 15, 1919, *J. R. Churchill;* fig. 4, expanded flower, × 1, from same collection as fig. 3; fig. 5, expanded flower, × 1, from Cass Lake, Minnesota, *A. M. Johnson*, no. 3191; fig. 6, seeds, × 5, from Shelburne, New Hampshire, *A. H. Moore*, no. 4875.

O. biennis, var. nutans (Atkinson & Bartlett) Wieg.: fig. 7, calyx, × 3, from south of Petersburg, Virginia, *Fernald & Long*, no. 9604; fig. 8, expanded flower, × 1, from no. 9604; fig. 9, expanded flower from east of Corinth, Warren Co., New York, *House*, no. 28,028; fig. 10, seeds, × 5, from Garrett Co., Maryland, *Steele*, no. 94.

Plate 1138. Oenothera biennis L., var. canescens Torr. & Gray: fig. 1, calyx, × 1, from Cherryfield, Saskatchewan, *Herriot*, no. 72,378; fig. 2, calyx, × 1, of isotype of *O. canovirens* Steele, from Concord, Morgan Co., Illinois, August 20, 1910, *Steele;* fig. 3, calyx, × 3, from same plant as fig. 2; fig. 4, ovary and portion of calyx, × 3, from Clay Co., Iowa, *Ada Hayden*, no. 10,084; fig. 5, expanded flower, × 1, from *Herriot*, no. 72,378; fig. 6, seeds, × 5, from Story Co., Iowa, August 15, 1933, *Ada Hayden.*

O. biennis, var. hirsutissima Gray: fig. 7, calyx, × 1, from Grand Teton National Park, Wyoming, *L. O. Williams*, no. 965; fig. 8, expanded flower, × 1, from New Plymouth, Idaho, *J. F. Macbride*, no. 733; fig. 9, calyx, × 3,

from *Williams*, no. 965; fig. 10, seeds, × 5, from Harrison Lake, Vancouver Island, *Carter*, no. 249.

O. argillicola Mackenzie: fig. 11, seeds, × 5, from Sweet Springs, West Virginia, *Steele & Steele*, no. 328.

Plate 1139. Oenothera parviflora L.: fig. 1, calyx, × 1, from Rivière à Pierre, Gaspé Co., Quebec, *Pease*, no. 20,303; fig. 2, expanded flower, × 1, from no. 20,303; fig. 3, seeds, × 5, from Cape Aylesbury, Prince Edward Island, *Fernald, Long & St. John*, no. 7835.

O. parviflora, var. angustissima (R. R. Gates) Wieg.: fig. 4, summit of plant, × 1, from general type-area, Lansing, New York, *Eames & Wiegand*, no. 10,461; fig. 5, calyx, × 1, from same plant as fig. 4; fig. 6, calyx, × 3, from same plant as figs. 4 and 5.

O. parviflora, var. Oakesiana (Robbins) Fernald: fig. 7, seeds, × 5, from Provincetown, Massachusetts, *Fernald & Long*, no. 18,845.

O. cruciata Nutt.: fig. 8, portion of type in Herb. Brit. Mus., × ca. ½.

Plate 1140. Oenothera parviflora L., var. Oakesiana (Robbins) Fernald: fig. 1, summit of type, × 1; fig. 2, bud, × 1, from topotype of *O. Tidestromii* Bartlett, from Millstone Landing, St. Marys Co., Maryland, *Blake & Tidestrom*, no. 11,666; fig. 3, ovary and portion of calyx, × 3, from last specimen.

Plate 1141. Oenothera cruciata Nutt.: fig. 1, summit of plant, × 1, from Nelson, New Hampshire, July 9, 1932, *F. W. Batchelder;* fig. 2, calyx, × 1, from Lexington, Maine, *Fernald & Strong*, no. 445; fig. 3, calyx, × 3, from no. 445; fig. 4, expanded flower, × 1, from no. 445; fig. 5, capsule, × 1, from Granville, New York, *F. T. Pember*, no. 20; fig. 6, same capsule, × 3; fig. 7, seeds, × 5, from Rollinsford, New Hampshire, September 2, 1896, *Parlin*.

Plate 1142. Oenothera cruciata Nutt., var. sabulonensis Fernald, all figs. from type: fig. 1, upper half of plant, × 1; fig. 2, bud, × 1; fig. 3, bud, × 3.

Plate 1143. Oenothera cruciata Nutt., var. stenopetala (Bicknell) Fernald: fig. 1, isotype, × 1, of *O. stenopetala* Bicknell, from Nantucket Island, Massachusetts, August 5, 1906, *Bicknell;* fig. 2, calyx, × 1, fig. 3, calyx, × 3, and fig. 4, expanded flower, × 1, all from Nantucket, August 18, 1917, *J. R. Churchill*.

4. Emendations in the Order Tubiflorae

(Plates 1144 and 1145)[1]

Convolvulus spithamaeus L., var. **pubescens** (Gray), comb. nov. *Calystegia sepium* (L.) R. Br., var. *pubescens* Gray, Man. ed. 5: 376 (1867). *Convolvulus sepium* L., var. *pubescens* (Gray) Fernald in Rhodora, x. 55 (1908), as to basonym only. *Calystegia Catesbeiana* Pursh, Fl. Am. Sept. ii. 729 (1814). *Convolvulus Catesbeianus* (Pursh) Ell., Sk. i. 255 (1817). *C. spithamaeus*, var. *Catesbeianus* (Pursh) Tryon in Rhodora, xli. 417 (1939).

Calystegia Catesbeiana Pursh was regularly misinterpreted as a variation of *Convolvulus sepium* L. until in 1939 I secured a photograph of Pursh's type (see Tryon, l. c. pl. 557, fig. 3), when it became apparent that it is the densely pubescent and terminally

[1] The engraving of these plates made possible through a gift from Mr. Bayard Long.

elongate and often twining southern extreme of the white-flowered *Conv. spithamaeus.* Gray and everyone else was misled by Pursh's "C. volubilis, tomentosa" and his "Flowers large, purple" into supposing that Pursh had a very pubescent extreme of the regularly twining and, with us, oftenest roseate-flowered *Convolvulus sepium.* Consequently, although he had no material (see Tryon, l. c. 422), Gray, in publishing *Calystegia sepium,* var. *pubescens,* cited as an absolute synonym of it *C. Catesbeiana.* In his Man. ed. 5 the species of *Calystegia* were: 1. *C. sepium;* 2. *C. spithamaea.* Under *C. sepium* with "the typical form *glabrous* throughout (Convolvulus sepium, and C. repens, *L.*)" Gray added

> "Var. PUBESCENS is a downy form, in the young state approaching the next. (C. Catesbyana *Pursh.*)."

In other words, *Calystegia sepium,* var. *pubescens* was a renaming, as a variety, of *C. Catesbeiana* Pursh and it had no other basis. As the first varietal name used for the latter it must be taken up under the International Rules. The fact that later, in Syn. Fl. ii[1]. 215 (1878), Gray, still not knowing Pursh's type, reduced his own *Calystegia sepium,* var. *pubescens* to his *Convolvulus sepium,* var. *repens* (L.) Gray[2] does not alter the situation, as Tryon, l. c. 422, assumed. Gray, in the Synoptical Flora also included, as a synonym of his inclusive var. *repens, Calystegia Catesbeiana* Pursh, for he still supposed it a variation of *Convolvulus sepium* with "herbage from minutely to tomentose-pubescent", "minutely" belonging to *Conv. repens* L., "tomentose-pubescent" to var. *pubescens* (*Calyst. Catesbeiana*). The same interpretation of *Calyst. sepium,* var. *pubescens* (i. e. *C. Catesbeiana*) was made when *Conv. sepium,* var. *pubescens* (Gray) Fernald was published in RHODORA, x. 55 (1908). It was not until we had the photograph of Pursh's type that we realized that his *Calystegia Catesbeiana* did not have "Flowers . . . purple" and that, in reality, it is the southern montane extreme of white-flowered *Convolvulus spithamaeus.* As the first varietal name for the plant, var. *pubescens,* clearly based on *Calystegia*

[2] Although the combination *Convolvulus sepium,* var. *repens* is regularly cited as starting with Gray, Syn. Fl. N. Am. ii[1]. 215 (1878), it was earlier and properly published by Coleman in his Cat. Fl. Pl. So. Pen. Mich. (Kent Sci. Inst. Pub. no. 2), 30 (1874). Coleman should, therefore, be cited as author of the combination.

Catesbeiana, must stand, unless some earlier varietal name for it is found. The name *Conv. spithamaeus*, var. *Catesbeianus* has great merit and is historically clarifying but it is a later varietal name.

Convolvulus sepium L., forma **malachophyllus,** f. nov., foliis cordato-ovatis plerumque 3.5–4 cm. latis utrinque velutino-pilosis; caule pedunculis bracteisque tomentulosis; corollis roseis.—Type from Wickford, Rhode Island, June 17, 1908, *E. F. Williams* in Herb. Gray.

The type, along with several other specimens from a broad area—Anticosti Island to Illinois, Missouri and New Jersey—was distributed as *Convolvulus sepium*, var. *pubescens* (Gray) Fernald; but, as explained in the discussion of *C. spithamaeus*, var. *pubescens*, the nomenclatural basis of that name was badly confused. Forma *malachophyllus* is the very pubescent extreme, allied to *C. sepium*, forma *coloratus* Lange, the roseate-flowered color-form (including var. *americanus* Sims and var. *communis* Tryon) which in America is more frequent than typical white-flowered *C. sepium*, the latter in Europe more common than the roseate-flowered. In view of the fact that approximately 50% of the Eurasian material, there regularly treated as true *C. sepium*, has the leaf of var. *americanus* Sims, as treated by Tryon in Rhodora, xli. 420 (1939), while the other half of the specimens from Eurasia have the leaf of var. *communis* Tryon, l. c. 419, and many American specimens show both types of leaf on the same plant, I have reluctantly given up the effort to keep them apart. I am, however, maintaining var. *fraterniflorus* Mackenzie & Bush as a good geographic variety, not because it has a white corolla, but because the leaf-sinus is distinctive. In all Eurasian material before me (except 1 sheet) and in all American, except for var. *fraterniflorus*, the sinus is U- or V-shaped, with sloping sides. In var. *fraterniflorus*, occurring from Pennsylvania to North Dakota, south to Virginia, Kentucky and Arkansas, all well displayed leaves show a strongly quadrate or nearly square sinus, with parallel sides.[1] This character seems very real. It reappears in a single sheet from Nippon, *Kakuo Uno*, no. 24,144, collected August 17, 1939. From this specimen

[1] Unfortunately the leaf from a topotype shown by Tryon, l. c. pl. 558, fig. 6, has both basal lobes with inner margins folded back, thus obscuring the quadrate sinus.

the familiar range, temperate eastern North America and temperate eastern Asia, is indicated. The sheet from Nippon was distributed as *Calystegia subvolubilis* G. Don, Gen. Syst. iv. 296 (1838), which was a mere transfer of *Convolvulus subvolubilis* Ledeb. Fl. Alt. i. 222 (1829) and Icon. iii. 6, tab. 205 (1831); but *Conv. subvolubilis*, from Dahuria, is wholly different.

Another very striking variety of *Convolvulus sepium* is locally naturalized in western Nova Scotia. Typical *C. sepium* has the leaves acute or acutish and longer than broad, the ovate acute or acutish paired bracts 2–3.5 cm. long, and the white or roseate corolla 4.5–8 cm. high. In western Nova Scotia there also occurs an extreme with suborbicular to round-ovate leaves with blunt to rounded apex, the bracts blunt or round-tipped and only 1.5–2 cm. long, and the white corolla only 4–4.5 cm. high. This seems to be the local Dalmatian var. *dumetorum* Pospichal, Fl. Oesterreich. Küstenlandes, ii. 490 (1898). The two collections are as follows, both from Nova Scotia and distributed as *C. sepium:* roadsides, waste places and ballast-lands, Yarmouth, July 24, 1920, *Long & Linder*, no. 22,326; near a house, grassy or bushy roadsides, Barrington, *Fernald, Long & Linder*, no. 22,327. This variety, occurring near ports, evidently came in shipping from the Adriatic.

Convolvulus pellitus Ledeb., forma **anestius,** stat. et nom. nov. *Calystegia pubescens* Lindl. in Journ. Roy. Hort. Soc. i. 70, with fig. (1846); *Convolvulus pubescens* (Lindl.) Thellung in Viertelj. Naturf. Ges. Zurich, lii. 459 (1907), not *Conv. pubescens* Willd. (1809). *Volvulus japonicus* (Thunb.) Farwell, var. *pubescens* (Lindl.) Farwell in Am. Midl. Nat. xii. 130 (1930).

Convolvulus pellitus, forma *anestius* is the weedy double-flowered plant which has erroneously passed as a form of *C. japonicus* Thunb. That plant (the *Calystegia japonica* (Thunb.) Choisy or *Calysteg. sepium* (L.) R. Br., var. *japonica* (Thunb.) Makino) is, as Dr. Hiroshi Hara clearly demonstrated to me when he spent two years at the Gray Herbarium, wholly different: glabrous, with much longer leaves with 10 to 12 pairs of evident lateral veins, longer bracts up to 3 cm. long and with cordate bases, and the corolla as large as in *Conv. sepium* L. *C. pellitus* Ledeb. Fl. Alt. i. 223 (1829) and Icones, iii. 6, t. 206 (1831) and its double-flowered forma *anestius,* on the other hand, have the

stems and leaves densely soft-pubescent; the subtruncate-based leaves much smaller and with only 3–6 pairs of evident lateral veins; the bracts 1–2.5 cm. long and only gradually rounded (not cordate) at base; the corolla only 4–4.5 cm. high. Typical *Conv. pellitus* with normal simple corolla is rare with us as a weed; the only specimen I have seen (from Massachusetts) coming from an area where waste from woolen-mills abounds. It could have had a quite different origin with us from the common double-flowered plant.

The latter was first noted, apparently, when Lindley described and illustrated it as *Calystegia pubescens* in 1846, Lindley saying:

> "Raised from a very small portion of the root found in a dead Paeony root, in Box No. 22, from Mr. Fortune's mission in China. The box was sent from Shanghai, and stated to contain a plant of the double Convolvulus, which was supposed to be dead when received at the Garden in June, 1844.
>
> This curious plant approaches very nearly to the C. sepium or larger bindweed of our English hedges, from which it differs in having firmer and smaller leaves, much narrower bracts, and a fine pubescence spread over every part. It is the first plant of its order that has been mentioned as producing double flowers. They are about as large as those of a double Anemone, but the petals are arranged with the irregularity of the Rose; they are of a pale very delicate pink, and remain expanded for some days. The calyx is quite unchanged. The exterior petals are very much lacerated and irregular in form; those next the centre are narrow, drawn together into a kind of cone; the next central are completely concealed by those without them, and diminish until they are mere scales, analogous to those which may be found in the first buds which burst in the spring. Not a trace can be found of stamens or pistil."

The same year Lindley essentially reproduced his first account and published a colored plate in Bot. Reg. xxxii. t. 42 (1846), this plate and the account repeated by others. Comparison of Lindley's description and plate with Ledebour's account and beautiful plate of *Convolvulus pellitus* indicates that they are of the same species. However, *Index Kewensis* tells us that *Calystegia* "pubescens, Lindl. . . . = hederacea". *Calystegia hederacea* of Wallich, Cat. was a mere nomen but the Wallich material so named was the basis of *Convolvulus Wallichianus* Spreng. Syst. iv. Cur. Post. 61 (1827), not *Conv. hederaceus* L. (1753). But, obviously, *Conv. Wallichianus* had nothing in common with *Calyst. pubescens* Lindl. The former is very slender and quite glabrous ("utrinque glabris"—Spreng. instead

of "villosus"—Ledeb.), with petioles one half to quite as long as the membranaceous leaf-blade (instead of many times shorter than the firm and thick blade); the broadly hastate base three fourths as broad as to broader than (instead of one third to one half as broad) length of blade; the corolla much shorter.

Convolvulus pellitus, forma *anestius* (homeless) must have been much more in cultivation in the past than at present in the United States. Otherwise it would be most difficult to account for its appearance and spread in abandoned or fallow fields or waste places, on roadsides, etc.; for, producing no seed, it must depend on the unusual vigor (see Lindley's comment) of the slender subterranean parts for propagation. In the Gray Herbarium and that of the New England Botanical Club 37 different stations, all the way from eastern Maine to Michigan, Missouri and Tennessee, are represented, the earliest collection made in 1877, the latest in 1943.

IPOMOEA PANDURATA (L.) G. F. W. Meyer, forma **leviuscula,** nom. nov. Var. *rubescens* Choisy in DC. Prodr. ix. 381 (1845).

In RHODORA, xx. 65 (1918) Blake pointed out that the TYPE of *Convolvulus panduratus* L., therefore of *Ipomoea pandurata,* is the pubescent-leaved form and that, consequently, the "form with leaves glabrous beneath" is Choisy's var. *rubescens.* Choisy's adjective was unfortunate, for both plants have the stem commonly reddish, but he said "caule rubescente glaberrimo ut et foliis". The glabrous and pubescent forms grow somewhat interchangeably in the same areas, so that one may gather material in the same region (southeastern Virginia for example) of either of them. They do not have the geographic segregation one expects of true geographic varieties. I refrain from taking up for a form which differs from the typical plant in its lack of pubescence, the name given it as a variety, since that name is equally descriptive of both forms and, from my viewpoint, would be an absurdity. This case is another to add to those presented by Fassett in RHODORA, l. 249 (1948). Under the wise provision of the International Rules as they have stood for some decades there is no obligation to take over into a new category a name from another category when it would be wholly misleading. Art. 4 of the Rules specially urges us "to avoid or

to reject the use of . . . names which may cause error or ambiguity or throw science into confusion".

A New Polemonium from eastern Pennsylvania (Plates 1144 and 1145).—When in 1892 the late Dr. Britton described the localized *Polemonium Van-Bruntiae* Britton in Bull. Torr. Bot. Cl. xix. 224, pl. 131 (1892) it came as a surprise that in the woodlands of the Atlantic States there was a species so distinct from the much commoner *P. reptans* L. Now that *P. Van-Bruntiae* is well known at scattered spots all the way from western Vermont and New York to the upland of West Virginia[1], Mr. Bayard Long comes forward with another endemic, as yet known only in one limited area of alluvial woods in Montgomery County, Pennsylvania. Growing with the common blue-flowered *P. reptans*, the new plant is strikingly unlike it in many characters. Some years ago Mr. Long referred the plant to me for description, but in deference to others who work primarily on the *Polemoniaceae* I, naturally, refrained from entering polemics over a genus said by some to be named for Polemon of Athens, a Greek philosopher, but by Pliny said to come from *polemos* (war). Now, however, since two specialists on the group have definitely labeled the new plant *P. reptans*, I no longer feel it necessary to withhold publication.

Polemonium reptans (plate 1145, fig. 1), many times illustrated, has the thinnish middle and upper cauline leaves with acute or acutish leaflets; corolla deep blue, 1–1.6 cm. high, completely overtopping the stamens; the style included or barely exserted; the calyx-lobes lanceolate to lance-triangular and acute or acutish. *P. Longii* (plate 1144), on the other hand, has the thick oblong or oblong-oval leaflets obtuse and often bluntly lobulate toward the summit; the calyx-lobes bluntish and broader; corolla red-purple, 7–8 mm. high, much exceeded by the stamens, the style obsolete.

In its long-exserted stamens *Polemonium Longii* is, perhaps, more nearly allied to *P. Van-Bruntiae* (plate 1145, figs. 2 and

[1] The old-fashioned Jacob's-ladder of gardens, *Polemonium caeruleum* L., brought to our gardens from Europe, is occasional in waste and I find specimens of it from so far away from Vermont as rubbish-heaps of Gaspé Co., Quebec, and identified incorrectly by specialists on the group as *P. Van-Bruntiae!* Other perfectly typical *P. caeruleum*, derived from gardens in New Hampshire and originally with correct identifications, has twice been incorrectly annotated as *P. reptans*.

Photo. B. G. Schubert

Polemonium Longii, all figs. from type: figs. 1 and 2, portions of inflorescence, × ca. 1; fig. 3, cauline leaf, × ca. 1; fig. 4, flowers, × 3; fig. 5, calyces, × 3.

Photo. B. G. Schubert

POLEMONIUM REPTANS: FIG. 1, inflorescence and upper leaves, × 1, from western New York.
P. VAN-BRUNTIAE: FIGS. 2 and 3, inflorescence and cauline leaves, × 1, from eastern New York.

3), but it differs from that species as much as it does from *P. reptans*. *P. Van-Bruntiae* has the leaflets tapering to acute or acuminate tips; those of *P. Longii* are obtuse and often lobulate. The corollas of *P. Van-Bruntiae* are blue-purple and 1.2–1.5 cm. long, those of *P. Longii* red-purple and only 7–8 mm. high. During anthesis the calyx of *P. Van-Bruntiae* is 8–12 mm. long, that of *P. Longii* 5–6 mm. long and with blunter and shorter lobes; the anthers of *P. Van-Bruntiae* are 1.8–3 mm. long, the rounder anthers of *P. Longii* 1–1.3 mm. long. In *P. Van Bruntiae* the style is always exserted 3–10 mm., in *P. Longii* obsolete.

In any other genus such characters are specific. Surely, if *Polemonium Longii* is only *P. reptans* with every character different, it is useless to consider the recognition of specific differences in the family (in *Phlox* for example). The fact that it occurred with *P. reptans* is not an argument that it *is* that species. When *P. Van-Bruntiae* chooses a similar habitat we do not call it also *P. reptans;* nor, simply because they both live in Philadelphia and work at the same institution do we consider the discoverer of *Polemonium Longii* identical with the most prolific writer on that group. It is, of course, unfortunate that all the material of the newly proposed species was collected at a single station twenty-three years ago and the type-station later destroyed. Now that attention is called to it and its distinctive characters illustrated many keen botanists will be on the look-out for it. With this possibly polemical introduction I venture to describe

POLEMONIUM **Longii,** sp. nov., TAB. 1144, a *P. reptante* differt foliis crassioribus, foliolis oblongis vel oblongo-ovalibus obtusis plerumque ad apicem 2–3 lobulatis; calycibus 5–6 mm. longis lobis late deltoideis; corollis roseo-purpureis 7–8 mm. longis; staminibus valde exsertis, antheris reniformi-globosis 1–1.3 mm. longis; stylo obsoleto.—Montgomery County, PENNSYLVANIA: alluvial woods along Wissahickon Creek, west of Fort Washington, May 17, 1925, *Bayard Long*, no. 32,357 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.).

In PLATE 1144 all figures are from the TYPE of POLEMONIUM LONGII: FIGS. 1 and 2, portions of inflorescence, × ca. 1; FIG. 3, cauline leaf, × ca. 1; FIG. 4, flowers, × 3; FIG. 5, calyces, × 3.

In PLATE 1145 FIG. 1 shows an inflorescence and upper leaves, × 1, of P. REPTANS L. from along Cattaraugus Creek, Collins, Erie County, New York, *Anne E. Perkins*, no. 68; FIGS. 2 and 3, an inflorescence and cauline leaves,

× 1, of P. Van-Bruntiae Britton, from vicinity of North Harpersfield, Delaware County, New York, *Topping*, no. 182.

Phlox nivalis Lodd. ex Sweet, forma **roseiflora,** f. nov., corollis roseo-purpureis.—Type from open dry sandy woods near North, Orangeburg County, South Carolina, April 20, 1932, *Weatherby*, no. 6109 in Herb. Gray. Other material represented from Virginia to Florida and Alabama.

Typical *Phlox nivalis*, as the name implies and as shown in the original plate of Loddiges, has the corolla white. All colonies we have seen in southeastern Virginia (5 stations in Nansemond, Southampton and Greensville Counties) have consistently rose-purple or magenta corollas and some specimens from North Carolina, South Carolina, Florida and Alabama show in the dry material lingering purple or deep rose in the fading flowers or have memoranda recording such color. This difference of color of the fresh flowers is so striking that to those who know the Virginian plant in the field the specific name seems quite inappropriate. If one were after material for a rockery, it would be desirable to know whether the flowers are white or magenta!

P. subulata L., var. Brittonii (Small) Wherry, forma **australis** (Wherry), stat. nov. *P. subulata australis*, "var. nov.", Wherry in Bartonia, no. 11: 27 (1929).

In parallel columns on the same page Wherry published *Phlox subulata australis* as a variety with "Corolla normally deep purple" and *P. subulata brittonii*, based on *P. Brittonii* Small in Bull. Torr. Bot. Cl. xxvii. 279 (1900), this with "Corolla normally lavender white" and with very slight stated differences in measurements; both from the southern Appalachians. They seem to be color-forms rather than true geographic varieties and I am maintaining for the inclusive variety the earliest trivial name given these plants, Small's description and comparative notes being remarkably clear and to the point.

P. bifida Beck, var. **cedaria** (Brand), comb. nov. *P. Stellaria* Gray in Proc. Am. Acad. viii. 252 (1870). *P. Stellaria*, var. b. *cedaria* Brand in Engler, Pflanzenr. iv^{250}. 75 (1907). *P. bifida stellaria* (Gray) Wherry in Bartonia, no. 11: 34 (1929).

The glabrous or glabrescent and nonglandular mostly more southern variety of *Phlox bifida* was originally described from "'Cliffs of Kentucky River (probably above Lexington), in the

fissures of the most precipitous rocks', found only by the late Dr. Short, May 1, 1829 . . . Named from the resemblance to a *Stellaria* both in foliage and blossoms". Wherefore, since Brand regularly capitalized the initial letter of substantives used as specific names (*Gilia Sonorae*, "Im Staate S o n o r a", and *G. Jassajarae* Brand from "Jassajara Hot Springs") it is probable that he did not consult Gray's original account of *P. Stellaria*, for he treated the specific name as an adjective and incorrectly (by the rule he followed) decapitalized it. His *P. Stellaria*, var. *cedaria* was based upon Gattinger's material from Tennessee: "Cedar Barrens bei Lanergie? (Gattinger)", the query because he could not read Gattinger's LAVERGNE, which is clearly written on the labels of two fine sheets in the Gray Herbarium.

Brand evidently saw very inadequate or meagre material from Lavergne, for his description indicated the short leaves of the flowering shoots only, rather than the much longer leaves of the well developed vegetative branches:

> "Var. b. **cedaria** Brand. n. var. Folia 10–20 mm longa. Calyx et pedicelli glabriusculi.
> "T e n n e s s e e : Cedar Barrens bei Lanergie? (Gattinger, Herb. München.)"

One of the Gattinger sheets in the Gray Herbarium, no. 2150, coll. May 1, 1880, is of a small piece with three flowering branches on which the leaves are 0.8–1.5 cm. long, while the sterile leafy branches have them up to 3 cm. long. The other, a very large specimen covering the herbarium-sheet and bearing detailed notes by Gattinger, is similar but a very full specimen, collected June 21, 1880. The leaves of the flowering branches are as in the smaller piece, some of those of the vegetative shoots up to 4.5 or 5 cm. long.

Wherry, l. c., 29, discussing the inclusive *Phlox bifida*, quickly disposed of var. *cedaria*, saying "Brand's supposed variety, *P. stellaria cedaria*, is still less acceptable, being based on a specimen from which mature leaves had evidently been broken off [or were not represented]". Therefore, by his reasoning, although the glabrescent and nonglandular *P. Stellaria*, var. *cedaria* was on p. 29 "Brand's supposed variety", on p. 34 it was one of the "varieties which exhibit sufficient geographic segregation to deserve nomenclatorial treatment" and we find the combination

"**Phlox bifida stellaria** (Gray) Wherry, comb. nov." based on *P. Stellaria* Gray (1870); but, whereas Gray's TYPE and only cited specimen was "found only by the late Dr. Short, May 1, 1829", the plant is by Wherry now "Typified by a specimen collected at Camp Nelson, Jessamine Co., Ky., by E. T. W. April 11, 1928". The International Rules of Botanical Nomenclature are definite: we cannot reject the earliest varietal name for a variety and substitute for it an older name which was published only as specific. By the Rules the combination *P. bifida*, var. *cedaria* stands.

P. DIVARICATA L., forma **Coulteri,** f. nov. Unnamed but defined form of Watson & Coulter in Gray, Man. ed. 6: 355 (1890).

This very remarkable plant was sent to the late Sereno Watson by Dr. John M. Coulter with the accompanying letter:

Crawfordsville, Ind., May 22, '89

Dear Mr. Watson:

Here's a specimen we collected near here the other day. We found quite a patch of it, but most of it past season. It infests a dry, rocky glacial ridge. It is evidently *Phlox*, but I can't find that it has been described.

Yrs. as always
John M. Coulter.

Watson evidently asked why it is not *Phlox divaricata*, for Coulter's reply was as follows:

Crawfordsville, Ind.—
May 30, '89

Dear Mr. Watson:

Yes, we have plenty of *Phlox divaricata* growing all about us, & are perfectly familiar with it. The plant sent you has exactly the foliage cut of *P. divaricata*, but the flowers are so very different. They are very much smaller, & the remarkable abrupt acumination of the petals is unlike any Phlox I ever saw. In *P. divaricata* the petals are broad and notched, or sometimes entire in var. *Laphamii*. Another point in the case is that this is not a single isolated specimen, but there was a large area covered by these plants, all with the same characters. To me the plant looks like a pretty sharp variety of *P. divaricata*.

Yrs. as always,
John M. Coulter

As noted above, Watson & Coulter described this plant as an unnamed form the next year. Wherry in Bartonia, no. 12: 34 (1931), noted it as a form, "**Long-acuminate-lobed**", as dom-

inant near Crawfordsville "and widely known as the 'Crawfordsville form'"; just how "widely known" is not clear. At least, Deam in his Flora of Indiana did not mention it.

On the same page Wherry correctly noted the albino as *Phlox divaricata*, forma *albiflora* Farwell. Subsequently, however, he wrote in Bartonia, no. 16: 40 (1938): "In discussing white forms . . . one name was overlooked: *P. d. candida* Wetzstein. This has priority over *albiflora*, although whether it represented a pallid or an albino plant is not known". The unwary might, from this, think that Wetzstein's name should invalidate the properly defined *P. divaricata*, forma *albiflora* Farwell in Rep. Mich. Acad. Sci. xxi. 369 (1920). But, what Wherry does not bring out, is that *P. divaricata candida* Wetzstein in Proc. Ohio State Acad. Sci. iv. 361 (1906) was a *nomen nudum*, without a single word of description and, therefore, has no status whatever in nomenclature.

P. MACULATA L., forma **immaculata,** f. nov., a *P. maculata* differt caule immaculato; corollis albidis. TYPE: with the abundant purple-flowered plant in an open swamp, Fairfield, Connecticut, July 11, 1902, *E. H. Eames*, no. 180ac, in Herb. Gray.

Forma *immaculata* is the form of ordinarily spotted-stemmed and purple-flowered typical northern *Phlox maculata* in which the purple of stem and corolla are lacking, the stem being green, the corolla white. Specimens are before me from Connecticut and New York.

Brand in Engler, Pflanzenr. iv^{250}. 60 (1907) makes *P. suaveolens* Ait. Hort. Kew. i. 206 (1789) the nomenclatural basis for all white-flowered plants of the inclusive species, whether northern or southern, without differentiation, he calling them *P. maculata*, var. b. *suaveolens* (Ait.) Brand and citing also the *P. suaveolens* of Pers. Syn. i. 186 (1805), which was largely the *P. maculata*, var. *candida* Michx. of "Virginia, Carolina", therefore not the few-leaved and relatively low northern plant; and also *P. suaveolens* sensu Ell. Sk. i. 244 (1817), described from Savannah, Georgia (and on the outermost Coastal Plain), 250 miles south of the southern (Piedmont and Alleghenian) limit assigned by Wherry to any form of *P. maculata*. Brand also cited, under his all-inclusive var. *suaveolens*, *P. alba* Moench, Meth. Suppl.

173 (1802) but that was a substitute for *P. suaveolens. P. maculata* β. *candida* Michx. Fl. Bor.-Am. i. 143 (1803) was also cited but that belongs to the many-leaved southern variety, Michaux citing it from "Virginia, Carolina". In view of the fact that we do not know just what Aiton had before him as *P. suaveolens*, a cultivated plant, it would be very unwise to use that much misinterpreted name for a color-form of the wholly northern plant.

P. maculata L., var. purpurea Michx., forma **candida** (Michx.), stat. nov. *P. maculata*, β. *candida* Michx. Fl. Bor.-Am. i. 143 (1803).

I am retaining the first varietal name, properly defined, for the southern tall, many-leaved and more uniformly leafy variety of *P. maculata* which is called var. *pyramidalis* (Smith) Wherry in Bartonia, no. 14: 26 (1932), this based on the binomial *P. pyramidalis* Smith, Exot. Bot. ii. 55, pl. 87 (1806). Since Michaux had already given a clearly defined name for the variety that stands under the International Rules.

Physalis barbadensis Jacq., var. **glabra** (Michx.), comb. nov. *P. obscura* Michx., var. α. *glabra* Michx. Fl. Bor.-Am. i. 149 (1803). *P. barbadensis obscura* (Michx.) Rydb. in Mem. Torr. Bot. Cl. iv. no. 5: 327 (1896).

Michaux's *Physalis obscura* was immediately broken into two varieties: "Var. α. *glabra:* summitatibus et petiolis vix perceptibili pube"; and "—β. *viscido-pubescens*". The latter is perhaps the viscid-villous or -pilose typical *P. barbadensis*, while var. α. *glabra* is the glabrous or glabrescent variety (photograph of the type before me). As the first varietal name it supersedes var. *obscura* (1896) and the two are obviously the same plant.

Chamaesaracha **grandiflora** (Hook.), comb. nov. *Physalis grandiflora* Hook. Fl. Bor.-Am. ii. 90 (1834). *Leucophysalis grandiflora* (Hook.) Rydb. in Mem. Torr. Bot. Cl. iv. 366 (1896).

Leucophysalis was treated by Rydberg as a monotypic genus of the Canadian to Hudsonian area of eastern North America, but Dr. Armando Hunziker kindly calls my attention to the fact that it closely resembles similarly white-flowered plants of China and the Andean region; however, he is not ready to separate it from

inclusive *Physalis*. In the close and scarcely reticulate fruiting calyx, the rotate white corolla and some other points it seems to be too near to *Chamaesaracha*. The removal of this species (and some others) from *Physalis* would clarify the generic lines. Otherwise, *Physalis*, passing into *Chamaesaracha*, would be as cumbersome as *Aster* would become if we followed Otto Kuntze and placed in it the large and chiefly North American genus *Solidago*.

PENSTEMON TUBAEFLORUS Nutt., var. **achoreus,** var. nov., a var. typica recedit caule tenuiore 0.6–1 m. alto; foliis coriaceis, majoribus 1–2.5 cm. latis plerumque subacuminatis; cymulis inferioribus longe pedunculatis pedunculo 1.5–8 cm. longo.—Dry old fields, pastures, etc., New England and Ontario, south to Pennsylvania. TYPE from Aroostook County, MAINE: well established in a dry open field near cemetery, Fort Fairfield, July 17, 1939, *G. D. Chamberlain* in Herb. Gray.

True *Penstemon tubaeflorus* Nutt., occurring from Nebraska to eastern Texas, eastward to Mississippi, Tennessee, Indiana and Wisconsin, and slightly adventive to the Atlantic states, has 2–4 pairs of principal cauline leaves distant, submembranaceous and the larger ones 2–4 cm. broad and blunt to subacute, the lower cymules on peduncles only 0.2–1.5 (rarely –3) cm. long. The plant rather generally naturalized in New England and adjacent areas, although with the floral characters of *P. tubaeflorus,* is more slender and usually taller (0.6–1 m. high); its leaves are coriaceous, the pairs less distant, the larger cauline ones only 1–2.5 cm. broad and usually more acuminate; and the lower cymules are on peduncles 1.5–8 cm. long. This plant, var. *achoreus* (without a native land), was established in Maine as early as 1881 and it is now in many old fields throughout much of New England. It has evidently come in from farther west, but its native region is unknown.

P. CANESCENS Britt., forma **villicaulis,** f. nov., internodiis longe villosis.—Occasional in Virginia. TYPE: Fauquier Co., VIRGINIA: top of Oventop Mt., June 13, 1937, *Allard*, no. 3001 in Herb. Gray.

Typical *Penstemon canescens* has the internodes closely cinereous-puberulent; forma *villicaulis* has the stem from base into the inflorescence covered with elongate villi.

P. canescens Britt., forma **Brittonorum** (Pennell), stat. nov. *P. Brittonorum* Pennell in Small, Man. Se. Fl. 1204, 1508 (1933). *P. canescens brittonorum* (Pennell) Pennell in Acad. Nat. Sci. Phila. Mon. i. 222 (1935).

P. brevisepalus Pennell, forma **heterolasius,** f. nov., internodiis inferioribus puberulentis villis elongatis intermixtis.—Scattered through the range of the typical form. Type from Nelson Co., Tennessee: open roadside bank west of Belltown, May 22, 1933, *C. A. and Una F. Weatherby,* no. 6373, in Herb. Gray.

In typical *Penstemon brevisepalus* the lower internodes are closely puberulent; in forma *heterolasius* abundant long villi are intermixed.

P. australis Small, forma **odontophyllus,** f. nov., foliis rosulatis crenato-dentatis, caulinis valde duplicato-serratis.—Nansemond Co., Virginia: white sand of pine and oak woods and clearings near Cathole Landing, west of Factory Hill, July 18, 1944, *Fernald & Long,* no. 12,468 (type in Herb. Gray.).

Typical *Penstemon australis,* abundant and usually essentially unvarying in the sandy pinelands and oak woods of southeastern Virginia, has the radical leaves entire or nearly so, as are the cauline ones. Forma *odontophyllus,* known from a single station only, has the rosette-leaves regularly crenate-dentate and the cauline ones abundantly and somewhat doubly serrate-dentate. It is known only in overripe fruit. Younger material may show other characters.

Gratiola neglecta Torr., var. **glaberrima** (Fern.), comb. nov. *G. lutea* Raf., var. *glaberrima* Fern. in Rhodora, xxxiv. 149 (1932).

Gerardia, subgen. **Eugerardia** (Benth.), stat. nov. Sect. *Eugerardia* Benth. in Hook. Comp. Bot. Mag. i. 206 (1836).

Gerardia, subgen. **Otophylla** (Benth.), stat. nov. Sect. *Otophylla* Benth. l. c. 205 (1836).

Gerardia, subgen. **Panctenis** (Raf.), comb. nov. *Panctenis* Raf. New Fl. ii. 60 (1837). *Aureolaria,* subgen. *Panctenis* (Raf.) Pennell in Bull. Torr. Bot. Cl. xl. 408 (1913).

G. grandiflora Benth., var. **pulchra** (Pennell), comb. nov. *Aureolaria grandiflora* (Benth.) Pennell, var. *pulchra* Pennell in Proc. Acad. Nat. Sci. Phila. lxxx. 392 (1928).

G. flava L., var. **macrantha** (Pennell), comb. nov. *Aureolaria flava,* var. *macrantha* Pennell in Proc. Acad. Nat. Sci. Phila. lxxiii. 511 (1922).

G. **calycosa** (Mackenz. & Bush), comb. nov. *Dasystoma calycosa* Mackenz. & Bush in Rep. Mo. Bot. Gard. xvi. 105 (1905).

G. PEDICULARIA L., var. **intercedens** (Pennell), comb. nov. *Aureolaria pedicularia* (L.) Raf., var. *intercedens* Pennell in Torreya, xix. 207 (1919).

G. PEDICULARIA L., var. **austromontana** (Pennell), comb. nov. *Aureolaria pedicularia* (L.) Raf., var. *austromontana* Pennell in Proc. Acad. Nat. Sci. Phila. lxxi. 268 (1920).

(*To be continued*)

THE STATUS OF HICORIA BOREALIS ASHE

WAYNE E. MANNING

In 1896 W. W. Ashe described *Hicoria borealis* in an obscure pamphlet (Notes on Hickories, 1896) as follows:

"*Hicoria Rafinesque.*

The shag- or scaly-bark Hickories—Bud scales 10 to 12, accrescent and persistent during leafing; nuts angled, white or mealy; leaflets 3 to 7; bark of trunk usually shaggy.

(*a*) Fruit . . . . [*H. ovata* and *H. carolinae-septentrionalis*]
(*b*) Fruit rarely globular; husks thin, not splitting to the base, and usually not freeing the nut; nuts more or less angled and pointed.
H. borealis sp. nov. Fruit flattened, .5 inch long; husk thin, not splitting; nut white, sharply angled, kernel very large; leaflets 3 to 5, oblong-lanceolate, smooth, not dotted beneath with resinous globules. Region of the Great Lakes."

N. L. Britton in his Manual of the Flora of the Northern States and Canada (1901), in Britton and Shafer, Trees of North America (1908), and in Britton and Brown, Illustrated Flora of the Northern States and Canada, second edition (1913), gives a fuller description; C. S. Sargent in Trees and Shrubs (1913) and in Notes on North American Trees. II. Carya (Botanical Gazette **66:** 246, 1918) changed the species to a variety of *Carya ovalis.*

The descriptions by Ashe, Britton, and Sargent do not agree. The original description describes the tree as having extremely small fruit and smooth leaflets, the description by Britton indicates a somewhat larger fruit, and Sargent stresses the hairy twigs and rachises.

After a careful study of all specimens available, the writer

believes that the plant is related to the shag-bark hickory, *Carya ovata,* or might even represent a hybrid between *C. ovata* and either *C. glabra* or *C. ovalis.*

The following collections are the total in the New York Botanical Garden and the Arnold Arboretum:

O. A. Farwell 1354, Belle Isle (Detroit River), Mich., May 31, 1893 (N. Y.), the label being that of Ashe, with "Plants of Southern U. S., W. W. Ashe" marked out, and "no. 1354 Herb. Farwell" inserted; at bottom of label marked: number 3049 Herb. W. W. Ashe. Staminate flowers and leaves.

Farwell 1354, Belle Isle, Mich., October 1893 (N. Y.). Twig, leaves, fruit (in packet). (Each of the two mounted sheets at N. Y. of 1893 collections have May and October material on them.)

Farwell 1354, Belle Isle, Mich., Sept. 14 and Oct. 15, 1897 (N. Y.). Twig, leaves, fruit (attached to twig).

Farwell 1354, Belle Isle, Mich., Oct. 1898 and May 1899 (A. A.). Twig, leaves, pistillate flowers, fruits (some loose).

Sargent, Belle Isle, Mich., May 23, 1899 (A. A.). Staminate flowers and leaves.

Dodge, Grosse Isle, Detroit River, Mich., July 22, 1911 (A. A.). Twig, leaves, immature fruit.

No definite specimens were found in the Gray Herbarium, in the Ashe herbarium at the University of North Carolina, nor in the herbaria of the University of Michigan or Michigan State College.

It is uncertain just what constituted the type specimen for Ashe's species. Three letters throw some light on the problem. The first, from A. O. Farwell to Dr. N. L. Britton, dated Jan. 3, 1898, placed in the herbarium of the New York Botanical Garden, reads as follows:

"Two or three years ago Mr. W. W. Ashe wrote me a personal letter asking me to send him specimens of the hickories that grew in my vicinity as he was making a study of the genus. I complied, sending him specimens of what I termed *H. ovata, H. minima, H. microcarpa.* I have just heard from him and he says that the material sent as *H. microcarpa* can not be referred to that species which is an extreme eastern one. He at the same time asked for more and fresh material. I am sending him a package similar to the one I send you. He thinks it a peculiar form and may describe it. What do you think of it?

"I have noticed but one tree on the island but there may be any number of them as I have not paid much attention to the hickories. It is a tree 20 to 25 feet in height or perhaps a little more. It begins to branch five

or six feet from the ground, the lower branches being well filled with the nuts which are easily within reach of the hand. The tree is compact and in outline oblong or ovate. I think the bark is close. I would be glad to have your opinion of it."

The second letter, from Professor Sargent to Professor W. J. Beal, dated June 2, 1899, and placed in the herbarium of Michigan State College, reads in part as follows:

"I have been out as far as Belle Isle to look up Hicoria borealis. I saw the only plant on the island which is supposed to belong to this species. I was not able, however, to distinguish it from the scaly barked pignut which is not rare. According to Mr. Farwell, Ashe did not describe his species from this tree, although he considered that it belonged to his species. According to Mr. Ashe *Hicoria borealis* is common in central Michigan. Ashe in some respects is a good observer but if I have to depend on what I saw at Belle Isle I certainly cannot admit this species of his . . . "

Another letter to Professor Beal, dated June 18, 1899, reads in part as follows:

"I do not think Farwell knows anything about *Hicoria borealis* except as it may be found on Belle Isle. Ashe speaks of it growing in the central part of the state . . . Ashe's notes as to its localities are very vague but I suppose you have his paper. If not, I will have what he says about this species copied and sent to you."

It is possible that Ashe had some specimen on hand not so far located or even thrown away, or he may have been describing characteristic *C. ovalis* var. *odorata* such as H. C. Skeels, Grand Rapids, Mich., October 12, 1895, deposited in the herbarium of Michigan State College (though in the same publication mentioned above he described *H. odorata* and its var. *villosa*).

It would appear, however, from Farwell's letter, from the date of publication of the species, and from Ashe's notation on the herbarium label at the New York Botanical Garden that the type came from the collection of Farwell, and would be the specimens at the New York Botanical Garden collected in 1893 from the Detroit River, even though Sargent, probably referring to the vague data of distribution in Ashe's description, did not believe so. Ashe presumably made a tentative description in 1896 from the specimens first received from Farwell, and had hoped to make a fuller description later from new material. The letter of Farwell, his collection-numbers and locality, the letter of Sargent, and the great similarity of the specimens indicate

that all of the above collections of Farwell and of Sargent are from the same tree, and the true description may safely be based on the combination of these specimens.

I have been unable to find in this group of specimens a fruit quite as small as .5 inch long; although the fruit and the nut (loose in the packet) of the 1893 collections are extremely small, the fruit measures 22 mm. long. I believe that Ashe's measurement is a typographical error, or refers to the body of the nut, which is 5/8 inch (15 mm.) long, or was described erroneously from memory. The leaves are glandular beneath, but not conspicuously so. The fruit does in most of the collections appear indehiscent, but it is strongly ridged to the base and may dehisce in November after a heavy frost; the nut of the October, 1893, collection is free from the husk.

The descriptions of Britton, apparently based on Farwell's 1893 and 1897 collections, are essentially correct for the type tree. The writer finds, however, that the fruit varies in the different collections from 22–30 mm. long, and is about 20 mm. thick; the terminal bud, as far as collected, is in at least one collection about 10 mm. long, not 1/3 inch.

Basing their opinions on the small size of the fruit, on the thinness of the husk, which varies from 1 mm. in the original collection to 3.5 mm. in later collections, on the slender twigs, and on the "indehiscent" fruit, Ashe and Britton considered the tree a good species related to *H. odorata* (now *Carya ovalis* var. *odorata*), and Sargent considered it a variety of *Carya ovalis*.

All specimens show, however, definite characteristic tufts of hairs on the serrations ("ciliate" according to Britton) which the writer has pointed out in previous articles are characteristic of *C. ovata* and which never occur in *C. ovalis*. Furthermore some of the husks are 3.5 mm. thick, as indicated above, the leaves darken in drying, the terminal buds are elongate and are similar to those of *C. ovata*, and the nut is white, ridged, and thin-shelled; these are all features of *C. ovata*.

This may be merely an aberrant tree, or it might be a hybrid between *C. ovata* and either *C. glabra* or *C. ovalis*, with the leaves of the first species and the thin husks of one of the pignuts. The writer believes, at least, that it is closer to *C. ovata*, and here transfers it to that species as a variety:

C. ovata (Mill.) K. Koch var. **borealis** (Ashe), comb. nov. *Hicoria borealis* Ashe, Notes on Hickories, 1896, read before Elisha Mitchell Society, Chapel Hill, N. C. and distributed at the meeting; in Britton, Manual of the Flora of the Northern States and Canada, 1901, p. 325; in Britton and Shafer, Trees of North America, 1908; in Britton and Brown, Illustrated Flora of the Northern States and Canada, 2nd edition, 1913, p. 583. *Carya ovalis* (Wang.) Sarg. var. *borealis* (Ashe) Sargent, in Trees and Shrubs II, 1913, p. 209. *C. borealis* (Ashe) Schneider, in Ill. Handb. Laubholz. 1906, I, p. 803. *H. ovalis borealis* (Ashe) Ashe in Charleston Mus. Quarterly **1**: no. 2: p. 129. 1925. *C. ovalis* var. *borealis* (Ashe) Sarg. in Manual of Trees of North America 1933: p. 195.

Differs from the typical species in the usually thin husk, in the somewhat flattened fruit, and in the small size of the fruit. The specimen of Dodge seems to belong here, with small thin-husked fruit and with tufts of hairs on the serrations, but the twigs and leaves are rather hairy as in many trees of *C. ovata;* the specimens from the type tree are glabrate (somewhat minutely puberulent). It was probably on this specimen of Dodge that Sargent based his description of *C. ovalis* var. *borealis.* It is interesting to note that in Otis, Michigan Trees (1915 and later) and in at least two publications of Gleason, *C. microcarpa* (now *C. ovalis*) is described as having hairy twigs. I have not seen any specimen of positive mature *C. ovalis* with clearly hairy twigs.

This is a weak variety. The fruit and nut are about the same size as *C. ovata* var. *Nuttallii* Sarg., whose nut according to Sargent's Manual of Trees (1933) is 15 mm. long and 10–12 mm. broad. Sargent states that the fruit of *C. ovata* ranges from 1 to 2½ inches long (2.5–6.2 cm.) with a husk 3–12 mm. thick.

It should be pointed out that this variety would be impossible to distinguish in a sterile condition from ordinary *C. ovata.*

Bucknell University, Lewisburg, Pennsylvania.

Aster ontarionis the same as A. pantotrichus (A. missouriensis).—Although the plant generally known as *Aster pantotrichus* Blake (*A. missouriensis* Britton, 1898, not *A. missuriensis* O. Ktze., 1891) is one of the most common species of the Middle West, the late Dr. K. M. Wiegand saw only a few imperfect specimens of it when he prepared his account of *Aster*

lateriflorus and some of its relatives (Rhodora **30:** 161–179, 1928). He likewise saw very limited material of a plant found along the Upper St. Lawrence River and about eastern Lake Ontario, which he described as a new species, *Aster ontarionis.* To anyone familiar with the abundant, weedy, and variable midwestern plant, Wiegand's key differences ("heads racemose: pappus copious, soon exserted: stem rather stout: leaves 10–30 mm. wide" for *A. missouriensis,* "heads paniculate: pappus scarcely exserted: stem more slender: leaves narrower, 8–15 mm. wide: plant more like *A. Tradescanti* in habit" for *A. ontarionis*) do not sound convincing. Both have leaves pubescent over the entire under surface. Usually this pubescence is very dense on all of the leaves and leafy bracts, but in occasional plants it is evident only on the lower leaves, which may be withered at flowering time. Another feature of both, not mentioned by Dr. Wiegand because not clearly shown in the specimens available to him, is the presence of creeping and branching rootstocks, by which the plants form dense beds. This affords an easy field distinction between these plants and the related *A. lateriflorus* (L.) Britton, which lacks creeping rootstocks. After examining more than 500 sheets of *Aster pantotrichus* (under the names *A. missouriensis, A. miser, A. diffusus, A. lateriflorus,* and others of more remote relationship) and more than a score of *A. ontarionis,* I am well convinced that only one variable species is represented. The earliest valid name, rather inappropriately, is *Aster ontarionis* Wiegand. Most of the specimens I have examined are annotated as *A. pantotrichus.*

Aster ontarionis is a plant of clay and silt, chiefly in limestone regions, primarily characteristic of stream bottoms and damp grounds in the prairie states of the Middle West, but extending eastward along the lower Great Lakes-St. Lawrence lowland, and occurring locally toward the southeast. Its known limits of distribution are Minnesota, eastern South Dakota, eastern Nebraska, eastern Kansas, central Arkansas, northern Mississippi, northern Alabama, central Tennessee, central Kentucky, Indiana, northern Ohio, northwestern New York, southwestern Quebec, southern Ontario, central Michigan, and Wisconsin (southwestern three-fourths of the state).

The plant reported as *A. missouriensis* var. *thyrsoideus* (Gray)

Wiegand in the *Flora of Indiana* by Deam (whose specimens I have examined) is merely one of the many growth forms of the species. Browsed or mowed plants may produce large-leaved shoots with mostly axillary heads. The type of *Aster missouriensis* Britton, figured in Britton and Brown's *Illustrated Flora*, ed. 1, **3:** 378, 1898, is such an atypical plant.—Lloyd H. Shinners, Southern Methodist University, Dallas, Texas.

Aster coerulescens the same as A. praealtus.—The late Dr. K. M. Wiegand, in his account of *Aster paniculatus* and some of its relatives (Rhodora **35:** 16–38, 1933) and, following him, Dr. Arthur Cronquist in his revision of the western North American species of *Aster* centering about *A. foliaceus* Lindl. (Amer. Midl. Nat. **29:** 429–468, 1943) use the name *A. coerulescens* DC. for a very common and widespread species of the western United States, occurring eastward in the north as far as Wisconsin and Upper Michigan, and southward in the west to New Mexico and Arizona. Both authors assign it to Texas, primarily on the basis of the type collection, which was made by Berlandier "in Mexici districtibus orientalibus provinciae Texas." No date is given in De Candolle's original description (Prodromus **5**: 235, 1836), but probable isotypes (despite differences in collection numbers) are dated November and December, 1828. According to Dr. S. W. Geiser's account (*Naturalists of the Frontier*, ed. 2, pp. 30–54, 1948), Berlandier accompanied a group of Comanche Indians and Mexican officers on a hunting expedition from November 19 to December 18, 1828, starting at San Antonio ("Bexar") and making a circle tour north and west through present Kendall, Kerr, Bandera, Uvalde, Medina, and Bexar Counties, above and near the southeastern escarpment of the Edwards Plateau in south-central Texas. This was in the "eastern districts of the Texas province of Mexico" of Berlandier's day. The common and conspicuous wild *Aster* of that area is *A. praealtus* Poir. (or one of the three varieties credited to the area by Wiegand; I question their validity). No species of the *A. coerulescens* type *sensu* Wiegand and Cronquist is known to grow there. The nearest region in which so-called *A. coerulescens* may occur (no specimens are at hand) is in Trans-

Pecos Texas, a region geographically distant (as viewed from Dallas, which is about a third as far from El Paso as is Ithaca, New York), geologically unrelated, and floristically distinct from the area of the type locality of De Candolle's species. Probable isotypes in the U. S. National Herbarium and the Gray Herbarium are clearly *A. praealtus*, with characteristic leaf-texture and venation. I do not concur in Dr. Wiegand's opinion (l. c., p. 27) that Gray was in error in assigning the specimen in his possession to *A. praealtus* (under its former name, *A. salicifolius*). The earliest name for the species erroneously called *A. coerulescens* is apparently *A. hesperius* Gray, *Synoptical Flora* **1** (pt. 2): 192, 1884: "Damp soil and along streams, S. Colorado and New Mexico to Arizona and S. California. Has been variously taken for *A. longifolius, Novi-Belgii, aestivus*, &c., and coll. by *Wright, Greene, Rothrock, Cleveland, Parish, Lemmon*, &c."—Lloyd H. Shinners, Southern Methodist University, Dallas, Texas.

Chenopodium hybridum L., var. **Standleyanum** (Aellen), comb. nov. *C. gigantospermum* Aellen, var. *Standleyanum* Aellen in Fedde, Repert. Spec. Nov. xxvi. 147 (1929) and *C. Standleyanum* Aellen, l. c. 153 (1929).

Surely *Chenopodium gigantospermum* Aellen, the commonest American representative of Old World *C. hybridum*, differs from the latter only in its larger seeds. It is so like true *C. hybridum* that acute botanists from Pursh to Standley have detected no difference; neither can others who had compared the plants, except in size of seed. *C. gigantospermum* is properly called *C. hybridum* L., var. *gigantospermum* (Aellen) Rouleau in Nat. Canad. lxxi. 268 (1944). Its seeds are 1.5–2 mm. in diameter, the variety of wide range from the Atlantic to the Pacific. Var. *Standleyanum*, chiefly of the interior of the continent, has the seeds 2–3 mm. broad.—M. L. Fernald.

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CONTENTS:

Contributions from the Gray Herbarium of Harvard University.—No. CLXIX.

Part II. Studies of Eastern American Plants. *M. L. Fernald*

5. Some Northern Astereae. 93
6. Transfers and Minor Variations. 103

Mistletoe on Persimmon. *J. T. Baldwin, Jr.* 105

Some Grasses new to West Virginia. *Francis Welles Hunnewell.* 106

Additions to the Harris "Flora of Windham, New Hampshire." *A. R. Hodgdon and Herbert Friedlander.* 107

Hypericum adpressum, forma spongiosum. *M. L. Fernald.* 112

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Solidago Purshii: fig. 1, type of *S. humilis* Pursh, basis of *S. Purshii*, with annotation by Asa Gray, × ca. ½; fig. 2, recent specimen, × 1, from type-region; fig. 3, portion of inflorescence, × 3, from latter plant.

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CLXIX.

PART II. STUDIES OF EASTERN AMERICAN PLANTS

M. L. FERNALD

(*Continued from page 85*)

5. SOME NORTHERN ASTEREAE (PLATES 1146–1150)

SOLIDAGO PURSHII, NOT S. CHRYSOLEPIS (PLATE 1146).—Mr. David Erskine kindly calls to my attention a lapse in my recent analysis of the nomenclature of the boreal virgate goldenrod which long but incorrectly passed as *Solidago uliginosa* Nutt. In RHODORA, xlix. 294 (1947), in pointing out some of the morphological characters which separate this essentially northern and chiefly calcicolous species from the mostly more southern and oxylophytic true *S. uliginosa* (*S. neglecta* Torr. & Gray; *S. uniligulata* (DC.) Porter), I overlooked the ultimate result, as regards the former species, of an analysis of a very confused situation regarding the publication and interpretations of *S. humilis* Pursh, Fl. Am. Sept. 543 (1814), not Miller (1768), which I had published in RHODORA, x. 88–91 (1908).

There, unaware that the type of *Solidago uliginosa* Nutt. was characteristic *S. neglecta*, I was following the traditional interpretations, and was demonstrating that the technical type of *S. humilis* Pursh, not Miller, is the small Newfoundland specimen collected by Banks. It, therefore, followed that, when Porter substituted for the name *S. humilis* Pursh, without citation of anything but the Pursh reference, the name *S. Purshii* in Bull. Torr. Bot. Cl. xxi. 311 (1894), the latter name, nomenclaturally,

went back to the Pursh type (the Banks specimen), our FIG. 1, × ca. ½. Immediately to confuse the situation, however, the name *S. Purshii* was taken up, as in Britton & Brown, Ill. Fl. iii. 337, fig. 3687 (1898), for the wholly different, low and glutinous plant, quite unknown from Newfoundland, which had been erroneously passing as "*S. humilis*"; this continental narrow-leaved glutinous plant apparently correctly called *S. racemosa* Greene, Pittonia, iii. 160 (1897).

Although in 1908 I had the typification of *Solidago humilis* Pursh (= *S. Purshii* Porter) correctly worked out, I had forgotten in 1947 my conclusion from the very complicated bibliography. It is, however, quite clear, as Mr. Erskine indicates, that the name SOLIDAGO PURSHII Porter (1894) must be used for the long misnamed boreal and calcicolous "*S. uliginosa*" instead of the much later *S. chrysolepis* Fernald in Ottawa Nat. xix. 168 (1905). Banks collected in southeastern Labrador and along the north-eastern coast of Newfoundland. His plant, TYPE of *S. humilis* Pursh, not Miller, consequently of *S. Purshii* Porter, with the annotations by Asa Gray discussed by me in 1908, is shown, × ca. ½, as FIG. 1. Beside it is a modern specimen from north-eastern Newfoundland (Quirpon Island, *Fernald & Long*, no. 29,114), × 1 (FIG. 2), with the summit of the thyrse shown, × 3, as FIG. 3. Both plants are dwarfs from bleak habitats but that they are reduced specimens of the boreal species which for nearly a century incorrectly passed as "*S. uliginosa*" can scarcely be questioned.

ASTER AZUREUS Lindl., forma **laevicaulis,** f. nov., caulibus laeviusculis sublucidis.—TYPE from ILLINOIS: Fountaindale, Winnebago Co., 1867, *M. S. Bebb* in Herb. Gray.

An isotype of *Aster azureus* from St. Louis, *Drummond*, shows it to be the form with harshly scabrous stem, which was separated from the more widely dispersed plant with smooth and lustrous stems as *A. azureus scabrior* Engelm. ex Burgess in Small, Fl. Se. U. S. 1215 (1903). Engelmann, presumably realizing that the Drummond type was the form with "extremely rough" stem, seems not to have published the name. This, typical *A. azureus*, is apparently less abundant than the smooth-stemmed forma *laevicaulis*. At least, in the Gray Herbarium there are twice as many specimens of the latter as of the former.

A. AZUREUS Lindl., var. **poaceus** (Burgess), stat. nov. *A. poaceus* Burgess in Small Fl. Se. U. S. 1215, 1339 (1903).

As Burgess originally said, his *Aster poaceus* "Represents the extreme of attenuation among the kindred of *A. azureus*". Engelmann had it as an unpublished variety of *A. azureus* from Texas; Hasse distributed it from Arkansas as "a form" of *A. azureus:* and Sereno Watson marked other Hasse material as "*A. azureus*, var.—Chapman, f. Hasse". I agree with Engelmann and Chapman.

A. CILIOLATUS Lindl., forma **comatus** (Fern.), stat. nov. *A. Lindleyanus* T. & G., var. *comatus* Fern. in RHODORA, vi. 142 (1904).

A. TARDIFLORUS L., forma **vestitus** (Fern.), stat. nov. Var. *vestitus* Fern. in RHODORA, i. 188 (1899).

A. PUNICEUS L., forma **candidus,** f. nov., ligulis albis.—Washington Co., NEW YORK: wet place, J. D. Pierce's farm, West Road, Welch Hollow, north of Fort Anne, September 26, 1916, *Stewart H. Burnham* in Herb. Gray.

Forma *candidus* is the albino of typical *Aster puniceus*. It should not be confused with *A. puniceus*, var. *lucidulus* Gray, forma *albiflorus* R. Hoffm. in Proc. Bost. Soc. Nat. Hist. xxxvi. 339 (1922), which is the albino of *A. puniceus*, var. *firmus* (Nees) Torr. & Gray, from which I am unable to separate var. *lucidulus*, except as a minor form. When, in Am. Midl. Nat. xxvi. 414 (1941), Shinners published the combination *A. puniceus*, f. *albiflorus* (Farw.) Shinners, based on *A. puniceus*, var. *albiflorus* Farwell in Rep. Mich. Acad. Sci. xvii. 171 (1916), he apparently overlooked the fact that the identical formal name may not be used twice within a single species.

A. PUNICEUS L., forma **demissus** (Lindl.), stat. nov. Var. *demissus* Lindl. in Bot. Reg. xix. t. 1636 (1833).

A. PUNICEUS, var. FIRMUS (Nees) T. & G., forma **lucidulus** (Gray), stat. nov. *A. puniceus*, var. *lucidulus* Gray, Syn. Fl. i^2. 195 (1884). *A. lucidulus* (Gray) Wiegand in RHODORA, xxvi. 4 (1924).

I am quite incapable of separating *Aster lucidulus* as a species or even as a geographic variety. Its range essentially coincides with that of var. *firmus* (var. *laevicaulis* Gray), the only tangible difference being its entire, instead of more or less serrate, leaves.

A. ERICOIDES L., forma **prostratus** (Ktze.), stat. nov. *A. multiflorus* Ait. β. *prostratus* Ktze. Revis. Gen. Pl. i. 313 (1891).

Forma *prostratus*, as described by Otto Kuntze from Nebraska, "Caulis prostratus ramis erectis" is a very depressed and wind-swept form, strikingly unlike the sturdy upright plant. Such closely matted extremes occur in bleak habitats (like crests of sea-cliffs) in New England.

A. ERICOIDES L., forma **exiguus** (Fern.), stat. nov. *A. multiflorus* Ait., var. *exiguus* Fern. in RHODORA, i. 187 (1899).

Although the combination *A. exiguus* (Fern.) Rydb. in Bull. Torr. Bot. Cl. xxviii. 505 (1901) rests nomenclaturally on *A. multiflorus*, var. *exiguus*, the plant Rydberg describes can hardly be the same. Forma *exiguus* is the ascending plant with heads mostly solitary at the tips of the branches.

A. CAERULESCENS DC., var. **angustior** (Wieg.), comb. nov. *A. praealtus* Poir., var. *angustior* Wiegand in RHODORA, xxxv. 24 (1933).

For discussion of the specific names involved see Shinners in RHODORA, li. 91 (1949).

A. CAERULESCENS, var. **subasper** (Lindl.), comb. nov. *A. subasper* Lindl. in Hook. Comp. Bot. Mag. i. 97 (1835). *A. salicifolius* Ait., var. *subasper* (Lindl.) Gray, Syn. Fl. i². 188 (1884). *A. praealtus* Poir., var. *subasper* (Lindl.) Wieg. in RHODORA, xxxv. 24 (1933).

ASTER FOLIACEUS OR A. CRENIFOLIUS IN THE NORTHEAST—WHICH? (PLATES 1147–1150).—In RHODORA, xvii. 13–16 (1915) I pointed out that *Aster foliaceus* Lindl. in DC. Prodr. v. 228 (1836), described from Unalaska with leaves oblong-lanceolate, clasping and subserrate, the heads terminating axillary branches, the phyllaries ("invol. squamis") foliaceous and glabrous, is very characteristic also in Labrador, Newfoundland, eastern Quebec and northern New England. At that time I noted some varieties differing from the variations which occur in cordilleran North America. Typical *A. foliaceus* sensu Fernald (as well as Lindley, Gray and others) and its vars. *arcuans* and *subpetiolatus* Fern. l. c. are widely distributed in the Northeast (just as are many other species in many genera which are also Alaskan). Var. *subgeminatus* Fern. l. c. 16, with the lower leaves having long

subpetiolate bases and the involucre only 5–6 mm. high and of very slender nonfoliaceous phyllaries, as opposed to sessile leaves and broad foliaceous phyllaries 8–15 mm. long, is wholly distinct, being the endemic western Newfoundland representative of *A. ciliolatus* Lindl., *A. subgeminatus* (Fern.) Boivin in Naturaliste Canad., lxxv. 211 (1948). The rarest and most doubtful (probably extinct) eastern variety under *A. foliaceus* is var. *crenifolius* Fern. l. c. 15, an extreme plant (PLATE 1147) ,differing from the others in its elliptic and bluntish short leaves pilose on midrib and stronger nerves beneath (FIG. 2, × 5) and with closely crenate margins. This extreme plant, doubtfully belonging with the others, and perhaps of hybrid origin, was found by Collins, Pease and the writer forty-five years ago as a single clone on the treacherously overhanging crest of a deeply undercut and rapidly disintegrating soft red sandstone margin of the Gulf of St. Lawrence, where the sea was so rapidly breaking down the coast-line that the inhabitants were moving farther back. It was presumably long ago destroyed.

Although all these plants of the East were treated by me as varieties of *Aster foliaceus*, a more recent and much younger student, who has never seen the eastern plants growing, has announced that

> "I noticed that the eastern American plants which had been referred to *A. foliaceus* Lindl. could generally be recognized at a glance, purely by their habit. These specimens furthermore, were in some respects (such as the commonly toothed leaves) nearer to *A. douglasii* Lindl. than to *A. foliaceus*.
>
> "Upon re-examination of these eastern plants, I am convinced that they should be distinguished specifically from their western relatives."—Cronquist in Bull. Torr. Bot. Cl. lxxiv. 142 (1947).

Consequently, we get the following deduction:

"**Aster crenifolius** (Fern.) Cronquist, comb. nov. *A. foliaceus* var. *crenifolius* Fern. (Rhodora) **17:** 15. 1915."

There is the verdict of one who unites most morphologically distinct species in *Antennaria*[1], who similarly treats two remarkably distinct and geographically and ecologically usually separated species of *Solidago*[2], who can see no difference between the

[1] For discussion of such work see Fernald in RHODORA, xlvii. 221–235 and 239–247, plates 912–962 (1945)—repr. as Contrib. Gray Herb. no. clvii, pt. 1.

[2] For discussion see Fernald in RHODORA, xlix. 294–297 (1947); also this no. p. 93.

Atlantic North American *Petasites palmatus* and the abundantly distinct Pacific American *P. speciosus* (Nutt.) Piper[1], and whose pronouncements on many other *Compositae* have shown a "lumping" tendency beyond the comprehension of those with a vastly greater experience with the plants concerned. Can it be that the pendulum is swinging as far or farther in the opposite direction? It, at the time of this writing, being the Christmas season with its expected charity toward all, I will defer to another time further discussion of the amazing treatments of *Petasites* and some other genera. The seemingly conclusive statement, however, that in "the eastern plants [of *Aster foliaceus*] . . . their greatest similarity is not to *A. foliaceus* proper" (Cronquist, p. 142) needs immediate consideration, lest credulous readers adopt the not too carefully made conclusion.

If our eastern plant really differs from *Aster "foliaceus* proper" in "habit", in being "recognized at a glance" and in "commonly toothed leaves", it is noteworthy that so much of it should have the leaves entire or barely few-toothed, and should thus fit Lindley's definition of his *A. foliaceus* with leaves "subserratis". It is a striking fact also that sheet after sheet of specimens of the Alaskan plant, *A. "foliaceus* proper", can be placed side-by-side with sheets from Labrador, Newfoundland or eastern Quebec so that, if the labels are covered, anyone of ordinarily keen perception would be incapable of saying whence they came. And the very practical eye of the camera would be equally unable to detect a specific difference. Thus, in PLATE 1148, FIG. 1 is the summit of a plant, × 1, from the type-region of *A. foliaceus*, marked by Cronquist *A. foliaceus* var. *typicus*, this specimen being *Jepson*, no. 307, from Unalaska; FIG. 2 is the summit, × 1, of *Fernald & Wiegand*, no. 4114[a] from Bonne Bay, Newfoundland, originally called *A. foliaceus* but annotated by Cronquist as *A. crenifolius*. What is the *specific* difference, except that the Newfoundland plant has entire leaves, which is against the rule for *A. crenifolius*? In PLATE 1149, FIG. 1 is the summit of a plant from Le Conte Bay, Alaska, *Mr. & Mrs. E. P. Walker*, no. 880 (also validated as var. *typicus*); but beside it is a photograph (FIG. 2) of the summit of a specimen from Rivière Cap Chat, Matane County, Quebec, *Fernald & Smith*, no. 26,047. Again

[1] See Cronquist in Rhodora, xlviii. 125 (1946).

why are they of different species? In PLATE 1150, FIG. 1 is from the summit of a plant from Lituya Bay, Alaska, *R. H. Bates*, no. 151, also validated by Cronquist as var. *typicus:* while FIG. 2 is the lower leaf-surface, × 5. Beside it, as FIGS. 3 and 4, are a bit from the summit of *Fernald & Wiegand*, no. 4129 from Blanc Sablon, at the western entrance to the Straits of Belle Isle, this originally and correctly identified as *A. foliaceus* but that objectionable identification "corrected" by Cronquist to *A. crenifolius:* FIG. 4 being the lower leaf-surface, × 5. Take your choice; to most botanists they are of the same boreal plant.

Whatever typical *Aster crenifolius* (a portion of the TYPE, × 1 and the midrib beneath × 5, as PLATE 1147) may have been or may prove to be, whether a hybrid of *A. puniceus* or a more stable plant, most of the plants of our Northeast seem to me, as they did when I first studied them, quite indistinguishable from *A. "foliaceus* proper" or *A. foliaceus*, var. *typicus* of Alaska. Those who see "at a glance" a very distinct species in the East, must deduce something tangible before they can be safely followed. The identities of species of the region centering about the Gulf of St. Lawrence with remotely isolated species of the Alaskan area (*Poa eminens* J. S. Presl, *Hordeum brachyantherum* Nevski, *Listera borealis* Morong, *Epilobium glandulosum* Lehm., *Senecio Pseudo-Arnica* Less. and *S. resedifolius* Less., etc. etc.) are so numerous that an identity in *Aster* is to be expected.

A. JOHANNENSIS Fern., var. **villicaulis** (Gray), comb. nov. *A. longifolius* Lam., var. *villicaulis* Gray, Syn. Fl. i². 189 (1884).

Although *Aster johannensis* in its typical form (including *A. gaspensis* Victorin) is a dominant species from southern Labrador to Saskatchewan, south to Newfoundland, Prince Edward Island, northern and western New England, northern New Jersey, New York and southern Ontario, being in large part what has passed as *A. longifolius*, the densely villous var. *villicaulis* is abundant along rivers of eastern Quebec, New Brunswick and northern New England, not being known through the broad range of the species.

A. NEMORALIS Ait., forma **albiflorus** f. nov., ligulis albidis.—MAINE: south shore of Jordan Pond, Mt. Desert Island, September 10, 1894, *E. L. Rand*, TYPE in Herb. N. E. Bot. Club.

At its start the name *Aster nemoralis* Ait. Hort. Kew. iii. 198 (1789) was given as a result of considerable misinformation regarding the plant. The primary diagnosis was accurate enough for the full sheet which has been identified at the British Museum (Natural History) as the TYPE; but the trivial name given, the translation "Wood Star-wort" and the "Obs. . . . *Radius* caeruleus" were most unfortunate for a plant which characterizes sphagnous bogs and has lilac-pink ligules. On account of the supposed woodland-habitat and the blue ligules Willdenow in his Species Plantarum, iii[3]. 2021 (1803) took up *A. nemoralis* for the stiff plant of dry open ground or thin woods, with blue ligules, which had already been described as *A. linariifolius* L. Sp. Pl. 874 (1753); but since Aiton's plant came from Nova Scotia, where *A. linariifolius* is unknown, that interpretation can be dismissed. Other names were early published for the species which Aiton had, but misunderstood: *A. uniflorus* Michx. Fl. Bor.-Am. ii. 110 (1803) "*Hab.* in vastis sphagnosis", but Michaux's name was antedated by *A. uniflorus* Moench. Meth. 602 (1794); *A. ledifolius* Pursh, Fl. Am. Sept. ii. 544 (1814), "In sphagnous bogs and about mountain-lakes . . . rays lilac or reddish-purple", but Pursh's name was illegitimate for he cited as an exact synonym *A. nemoralis* Ait. and as the basis of his *A. ledifolius* β. *uniflorus* the *A. uniflorus* Michx. Everyone who knows the plant in the field agrees that it is not a species of the woods: "rayons violets ou roses . . . charactéristique des tourbières".—Victorin, Fl. Laurent. 612 (1935); "bogs and marshes, lake margins, and dominant on peaty barrens"—Roland, Fl. Nova Scotia, 494 (1947); "Peat bogs and open swamps"—Rand and Redfield, Fl. Mt. Desert, 116 (1894); "**Bog Aster** . . . distinctly the Aster of the Cedar Swamps and cold bogs"—Stone, Pl. So. New Jersey, 759 (1912).

In spite of the misleading name and the presumably incorrect description of the color of the ligules, there is no question that the plant preserved at South Kensington as the TYPE of *Aster nemoralis* otherwise definitely matches the description given by Aiton. Disturbed by the name used by him and by his *blue* ligules, I appealed to Dr. George Taylor, Deputy Keeper at the British Museum. He most kindly sends me beautifully clear photographs, one of the full sheet, one of an enlargement, and I

see at the bottom of the full sheet in my own handwriting "nemoralis", placed there in 1930! Dr. Philipson, in charge of the *Compositae*, compared fragments which I had sent of the Bog-Aster, *A. nemoralis* as generally understood, and of *A. Blakei* (Porter) House, which often grows in low woods, and writes: "The type appears to correspond to Fernald et al. 22805 (. . . 'nemoralis'); not at all to Fernald and Long 2466 (. . . 'Blakei')". It is wisest, therefore, to retain the name *Aster nemoralis* in its established sense. It is hardly more inappropriate than *Solidago nemoralis* Ait. for a species which abounds on dry open and barren habitats.

A. ACUMINATUS Michx., forma **subverticillatus,** f. nov., foliis imis valde reductis, foliis primariis subapproximatis internodiis 1–20 mm. longis, laminis 0.6–1.5 dm. longis.—Frequent through much of the range of the species. TYPE from MASSACHUSETTS: Lincoln, October 5, 1902, *Emile F. Williams* in Herb. Gray.

Aster acuminatus has two strikingly different but freely intergrading forms. Michaux described it "foliis omnibus conformibus" and my memorandum made when I studied the Michaux Herbarium in 1903 was: "The regularly leafy plant". The "regularly leafy plant" has the leaves almost uniformly scattered up the stem, the lower ones only slightly smaller than the median and upper ones, with the upper internodes mostly 1–3 cm. long and the larger blades mostly 0.5–1 dm. long. This typical *A. acuminatus* is shown in Britton & Brown, Ill. Fl. iii. fig. 3789 (1898) and in House, Wild Fl. N. Y. ii. pl. 247 (1920)[1]. A very characteristic illustration of forma *subverticillatus* will be found as *A. acuminatus* in Hooker in Curtis's Bot. Mag. liv. t. 2707 (1827).

A. ACUMINATUS, var. **magdalenensis,** var. nov., foliis regulariter distantibus late ovalibus acutis vel breviter acuminatis.—MAGDALEN ISLANDS, QUEBEC: TYPE from dry clearing, Étang du Nord, Grindstone Island, *Fernald, Bartram, Long & St. John,*

[1] NOTE ON DATES OF ISSUE OF HOUSE'S WILD FLOWERS OF NEW YORK.—In view of the date 1918 on the title-pages of both vols. 1 and 2 of House, Wild Flowers of New York, Univ. N. Y., State Museum, Mem. 15, it is important to note that the printed "Statement", dated from Albany, July 30, 1920, says that at that date "Volume I . . . is now ready for delivery". A similar "Statement", postmarked Dec. 3, 1920, says "It is expected that volume 2 will be issued in the course of three months". However, the copy in the library of the Gray Herbarium was received on the 15th of December, 1920.

July 25, 1912, no. 8159 in Herb. Gray. Other numbers are from Grindstone, Grindstone Island, *Fernald, Long & St. John*, no. 8160, and Ile Brion, *Victorin & Rolland*, no. 9807.

In typical *Aster acuminatus* the principal leaves are oblong-lanceolate to oblanceolate or narrowly subelliptic and long-acuminate, one fifth to scarcely half as broad as long. In var. *magdalenensis* they are broadly oval, nearly half as broad as long, and merely acute or very short-acuminate.

A. UMBELLATUS Mill., forma **intercedens,** f. nov., a forma typica recedit foliis subtus plus minusve pilosis.—TYPE from NEWFOUNDLAND: thicket on barrens at base of the serpentine tablelands, Bonne Bay, August 27, 1910, *Fernald & Wiegand*, no. 4131 in Herb. Gray.

Typical *Aster umbellatus* has the leaves glabrous beneath or merely pubescent along the midrib, but in more exposed situations from Newfoundland and from St. Paul's Island, Cape Breton, to the Mistassini Territory of Quebec (and probably beyond) it frequently has considerable pilosity on the lower surfaces of the leaves. It thus makes a strong approach to the northwestern var. *pubens* Gray, Syn. Fl. i^2. 197 (1884), although the hairs are coarser. The latter plant, when only the most extreme and relatively few representatives from different stations are separated from the mass of partly atypical material, has the upper leaves soft-pilose or tomentulose beneath and the phyllaries with varying amounts of pubescence on the back; while Cronquist, raising it to specific rank as *A. pubentior* Cronq. in Bull. Torr. Bot. Cl. cxxiv. 147 (1947), adds that its "heads are mostly 12–22-flowered, with 4–7 rays and 8–15 disk flowers, instead of 23–54-flowered, with 7–14 rays and 16–40 disk flowers" and also that, "Although there is some slight failure in the distinction", *A. pubentior* is a good species. In view, however, of the occurrence in otherwise perfectly good var. *pubens* of 33 flowers in a head (Clear Lake, Riding Mountain National Park, Manitoba, *Edith Scamman*, no. 2962), of 27 flowers in a head of plants with closely pubescent lower leaf-surfaces and pubescent phyllaries from the North Shore of Lake Superior (Schreiber, Thunder Bay Distr., Ontario, *Hosie, Losee and Bannan*, no. 348), of plants with all the characters of var. *pubens* but with 15 rays or ligules (north of Detroit Lakes, Becker County, Minnesota, *Philip Johnson*, no. 449), of several northwestern specimens with

Photo. B. G. Schubert

Aster crenifolius, all figs. from type: figs. 1 and 2, summits of plant, × 1; fig. 3, lower surface of leaf, × 5.

Photo. B. G. Schubert

Aster foliaceus, summits of plants, × 1: fig. 1 from type-locality, Unalaska; fig. 2 from Newfoundland, this plant identified by Cronquist as *A. crenifolius* (see plate 1147).

Photo. B. G. Schubert

Aster foliaceus, summits of plants, × 1: fig. 1 from Alaska; fig. 2 from Matane Co., Quebec, this plant identified by Cronquist as *A. crenifolius* (see plate 1147).

Photo. B. G. Schubert

ASTER FOLIACEUS: FIG. 1, summit of plant, × 1, from Alaska; FIG. 2, lower surface of leaf of same plant, × 5; FIG. 3, summit of plant, × 1, from Straits of Belle Isle, southeastern Labrador Peninsula, this plant identified by Cronquist as *A. crenifolius* (see plate 1147); FIG. 4, lower surface of leaf of plant shown in FIG. 3.

leaves of *A. pubentior* but with glabrous-backed phyllaries, and of extreme eastern plants with glabrous leaves and backs of phyllaries but with fewer than 23 flowers—in view of this situation I am satisfied that Asa Gray was right in his disposition of the more extreme northwestern plant.

6. Transfers and Minor Variations

Isoëtes melanopoda J. Gay & Dur., forma **pallida** (Engelm.), stat. nov. Var. *pallida* Engelm. in Trans. St. Louis Acad. Sci. iv. 387 (1882).

Botrychium simplex E. Hitchc., forma **laxifolium** (R. T. Clausen), stat. nov. Var. *laxifolium* R. T. Clausen in Bull. Torr. Bot. Cl. lxiv. 277, pl. 7 (1937).

Osmunda regalis L., var. spectabilis (Willd.) Gray, forma **nana,** f. nov., frondibus 1.5–3.5 dm. altis; pinnulis majoribus ellipticis vel oblongo-ovalibus 1.5–3 cm. longis, 0.8–1.1 cm. latis; panicula 5–10 cm. longa.—Alpine or bleak habitats of Newfoundland, Quebec and mountains of northern New England. Type from Newfoundland: serpentine and magnesian limestone barrens, northeastern base and slopes of Blomidon ("Blow-me-down") Mountains, Bay of Islands, August 2, 1910, *Fernald & Wiegand,* no. 2341 in Herb. Gray.

This very dwarf extreme is anything but regal or showy. It is the regular extreme on many mountains and in the type the fertile fronds reach a height of only 2 dm.

Acer rubrum L., forma **pallidiflorum** (K. Koch), stat. nov. Var. *pallidiflorum* K. Koch ex Pax in Engler, Bot. Jahrb. vii. 182 (1886).

Pyrola asarifolia Michx., var. **purpurea** (Bunge), comb. nov. *P. rotundifolia* L., β. *purpurea* Bunge in Mém. Sav. Étrang. ii. 542—repr. 20 (1835). *P. rotundifolia,* β. *incarnata* DC. Prodr. vii. 773 (1839). *P. asarifolia* Michx., var. *incarnata* (DC.) Fern. in Rhodora, vi. 178 (1904).

I am indebted to Dr. Hiroshi Hara for calling my attention to the earlier varietal name and to his generous suggestion that I publish the combination. Bunge's *P. rotundifolia,* β. *purpurea* was from the Altai region, DeCandolle's var. *incarnata* from Dahuria. It extends from north-central and eastern Asia into North America, crossing the continent northward and in our Northeast it too often passes into *P. asarifolia.*

Vaccinium angustifolium Ait., var. **hypolasium,** nom. nov. *V. pensilvanicum* var. *myrtilloides* sensu Fernald in Rhodora, x. 148 (1908) and *V. angustifolium* var. *myrtilloides* sensu House in Bull. N. Y. State Mus. 243–244: 61 (1923), not *V. myrtilloides* Michx., basonym, which proves to be identical with *V. canadense* Kalm.

V. myrtilloides Michx., forma **chiococcum** (Deane), comb. nov. *V. canadense,* forma *chiococcum* Deane in Rhodora, iii. 266 (1901).

V. corymbosum L., var. **albiflorum** (Hook.), stat. nov. *V. albiflorum* Hook. in Curt. Bot. Mag. lxii. (n. ser. ix.), t. 3428 (1835). × *V. corymbosum,* forma *albiflorum* (Hook.) Camp in Am. Midl. Nat. xxiii. 177 (1940).

Liatris graminifolia (Walt.) Willd., var. **virgata** (Nutt.), stat. nov. *L. virgata* Nutt. in Journ. Acad. Nat. Sci. Phila. vii. 72 (1834).

Dr. Gaiser in Rhodora, xlviii. 250 (1946) places Nuttall's *Liatris virgata* in the synonymy of *L. graminifolia,* var. *dubia* (Barton) Gray, which Mr. Haskell Venard has shown is antedated by an earlier varietal name and becomes *L. graminifolia,* var. *racemosa* (DC.) Venard in Rhodora, li. 35 (1949). It seems to me, however, that var. *virgata* is a well marked variety. Barton's *L. dubia,* basis of var. *dubia,* has spiciform racemes; and DeCandolle, under his *L. spicata,* var. *racemosa* (cited by Gaiser as identical with *L. dubia* but on DeCandolle's p. 131, instead of 130) cited plates in the Botanical Register and Loddiges' Botanical Cabinet which are very similar to the Barton plate. Nuttall's *L. virgata* was "Remarkable for the decomposition of its raceme and the long leafy pedicels." Nuttall's type shows the long racemose branches of the panicle nearly 2 dm. long. Other plants from the Southeast (South Carolina, Virginia and the Pine Barrens of New Jersey) are similar, sometimes with the panicled branches nearer 3 dm. long.

L. borealis Nutt., forma **albiflora** (Shinners), comb. nov. *L. novae-angliae* (Lunell) Shinners, f. *albiflora* Shinners in Am. Midl. Nat. xxix. 29 (1943).

L. aspera Michx., forma **Benkii** (Macbr.), comb. nov. *L. scariosa,* f. *Benkii* Macbr. in Field Mus. Pub. Bot. iv. 127 (1927).

MISTLETOE ON PERSIMMON

J. T. Baldwin, Jr.

Phoradendron flavescens (Pursh) Nutt. occurs from "central New Jersey to Ohio, Indiana and Missouri, south to Florida, Texas and New Mexico" (Britton and Brown, 1913). *Diospyros virginiana* L. is throughout this range except for the very southwestern portion (Sargent, 1922). Only four records of mistletoe on this persimmon are at hand.

Harper (1928) reported *Phoradendron* on *Diospyros* near North Alabama Junction, Tuscaloosa Co., Alabama; he stated in a letter of October 27, 1948, that "it may have been only one specimen on one tree". In 1917, near Keysville, Charlotte Co., Virginia, I found mistletoe growing on a persimmon, but I do not recall how many individual parasites there were. And on October 17, 1948, near Lake Drummond in the Great Dismal Swamp, Norfolk Co., Virginia, I saw two clumps of *Phoradendron* on a thirty-foot tree of *D. virginiana.* In both instances it is to be assumed that the mistletoe was referable to *P. flavescens,* for no other representative of the genus has been considered to be in Virginia. Mr. W. H. Pitman (letter of November 29, 1948) wrote me that some years ago in Surry Co., Virginia, he saw mistletoe on persimmon.

Inquiries addressed to Mr. C. C. Deam, Prof. M. L. Fernald, Dr. R. M. Harper, Mr. Bayard Long, Prof. Edgar T. Wherry—all with much field-experience within the ranges of these plants—brought no further record of mistletoe-persimmon association.

Curtiss (1878) wrote that mistletoe is abundant in Florida, "where it may be found on nearly every kind of tree", and recorded it as sometimes parasitic upon itself. Harper (1928) listed for Alabama nineteen genera (including two that are cultivated) as supplying one or more host species for mistletoe, and in the letter cited above he added *Hamamelis* as a twentieth genus. Deam (1940) indicated that four genera—including *Juglans* not mentioned by Harper—are known to serve in Indiana as hosts for mistletoe. In the northeastern part of its range (in New Jersey and Pennsylvania) mistletoe is invariably on *Nyssa sylvatica* and occasionally on *Acer rubrum:* both Mr. Long and Doctor Wherry have written me this.

Harper (1928) stated with respect to *Phoradendron* in Alabama: "it may be divisible into several species, which are to all appearances much alike but cannot be made to grow on trees too different from that to which they have been accustomed". Small (1933) recognized for Florida two species besides *P. flavescens.* Willis (1919) estimated for *Phoradendron* about one hundred species, all of them American.

That *Phoradendron* has such a series of hosts in a part of the area under discussion and in other regions evidences a restricted preference suggests considerable genotypic variation, which may be beyond the specific limits of *P. flavescens.* This becomes all the more significant since the greatest variety of hosts is concentrated in the southern part of the range and where contact with other recognized species is not to be unexpected. It could be that introgressive hybridization has occurred. And surely birds would have assured trial plantings of segregants on a wide variety of hosts. Indications are that only a rare genotype could grow on *D. virginiana.* But it must be remembered, too, that this persimmon is extremely variable and has intraspecific polyploid races (Baldwin and Culp, 1941). To accord with this idea of introgression the mistletoes on rare hosts should be the extremes among populations.

Literature Cited

Baldwin, J. T., Jr. and R. Culp. 1941. Amer. Jour. Bot. **28**: 942–944.
Britton, N. L. and A. Brown. 1913. Illustrated Flora, ed. 2.
Curtiss, A. H. 1878. Bot. Gaz. **3**: 36–37.
Deam, C. C. 1940. Flora of Indiana.
Harper, R. M. 1928. Economic Botany of Alabama, Pt. 2.
Sargent, C. S. 1922. Manual of the Trees of North America.
Small, J. K. 1933. Manual of the Southeastern Flora.
Willis, J. C. 1919. A Dictionary of the Flowering Plants and Ferns.

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Some Grasses new to West Virginia.—As the following grasses are not included in "West Virginia Grasses" published in 1944 by Dr. Core et al. it may be of interest to record their occurrence in that state.

Bromus Dudleyi Fernald. When this was described as a

new species in 1930 by Professor Fernald he gave its southern limit as New England and New York and stated "it has been confused with and usually distributed as *Bromus ciliatus*". At Capon Springs, Hampshire County, this was growing in rich woods. As Dr. Core states that *B. ciliatus* is "common throughout the state" it is probable that a further examination of material will show that *B. Dudleyi* occurs generally in the Alleghanies to Virginia and West Virginia.

Glyceria acutiflora Torr. In the summer of 1920 while at White Sulphur Springs, Greenbrier County, I found this in a small pool of water on the northerly slope of Kate's Mountain. It has been recorded from Kentucky and Tennessee but is not recorded from West Virginia by Dr. Core or by Hitchcock in his Manual of Grasses of the United States.

Panicum oligosanthes Schultes, var. Scribnerianum (Nash) Fern. First collected in 1945 at Capon Springs, Hampshire County, growing in dry gravelly soil and again in 1948 in Pendleton County where it was quite abundant in a sandy field. I have also found it on the easterly side of the Alleghanies in Frederick County, Virginia.—Francis Welles Hunnewell, Gray Herbarium.

ADDITIONS TO THE HARRIS "FLORA OF WINDHAM, NEW HAMPSHIRE."

A. R. Hodgdon and Herbert Friedlander

The "Flora of Windham"[1] is one of the few truly representative local compilations to have appeared in New Hampshire botany. Moreover, it seems to have been the most comprehensive one to confine itself to the plants of a single township.

William Samuel Harris, the author, taught for a number of years at Coe's Academy in Northwood. That he was a man of considerable versatility and breadth of interest is indicated by the following brief passage concerning his collections quoted from another part of the same work in which his flora appeared: "—of minerals and geological specimens there are four hundred, named and classified, some of them very choice. The antiqua-

[1] In Morrison, L. A. "Supplement to the History of Windham in New Hampshire" pp. 69–97, 1892.

rian department of the collection contains old books of the last century, continental currency, coins, old china and articles of household use." Mr. Harris was an amateur botanist of no mean ability, as shown by the considerable number of interesting species reported by him. Among the hitherto unreported local and significant species collected by him in Windham are: *Eleocharis tuberculosa*, *Paronychia canadensis*, *Viola palmata*, *Chimaphila maculata*, *Myosotis stricta* and *Eupatorium sessilifolium*.

Recently the senior author of this article became acquainted with Mr. John Hayden, a relative of the late Mr. Harris, who is now in possession of the 618 specimens which comprise the Windham collection. Through his generosity the authors have been permitted the loan of the collection for study. Most of the species reported in the "Flora" are present in the collection, with the exception chiefly of a number of common kinds. However, it was soon discovered that a very considerable number of Mr. Harris' collections were made later than the year 1892 and that these, for the most part, represent species not reported in the published list. Although the individual specimens do not all have accompanying geographical data, the collection, as a whole, is prefaced by a statement of Mr. Harris to the effect that every specimen "was gathered while growing in a wild state within the limits of the township of Windham in Rockingham County, New Hampshire". It is concluded, therefore, that the later collections represent added records for the township. A supplement listing the additional species will more nearly complete the work of Mr. Harris and also record more adequately a fragment of the New Hampshire flora.

Inasmuch as the identifications of the earlier specimens of the published list were essentially correct, it seemed unnecessary to revise the nomenclature of the original check list or alter it in any way. The later collections herein reported, however, are brought up to date, the accepted current binomial or varietal name being printed first if different from that employed by Harris and the name he used then given in italics.

Each plant is neatly mounted on one-half of a folded herbarium sheet. The specimens are sometimes fragmentary, which in a few instances makes determination difficult, but they are almost without exception carefully selected and beautifully

mounted. They are arranged according to the Bentham & Hooker system then in use in the 6th edition of Gray's Manual. The entire collection is housed in ten neatly-made wooden boxes designed by Mr. Harris to exactly fit the folded herbarium sheets.

To the original 610 species of the published flora of Windham thus it is now possible to add 115 more, bringing the published total to 725.

LIST OF HITHERTO UNREPORTED WINDHAM PLANTS IN THE W. S. HARRIS HERBARIUM

1. Pteridophyta

1. Lycopodium tristachyum Pursh
2. Selaginella apoda (L.) Fernald (*S. apus*)
3. Ophioglossum vulgatum L. var. pseudopodum (Blake) Farwell (*Ophioglossum vulgatum*)
4. Cystopteris fragilis (L.) Bernh.
5. Athyrium thelypterioides (Michx.) Desv. (*Asplenium thelypteroides*)[1]
6. Pteretis pensylvanica (Willd.) Fernald (*Onoclea Struthiopteris*)

2. Spermatophyta

7. Potamogeton amplifolius Tuckerm.
8. P. Berchtoldi Fieber var. tenuissimus (Mert. & Koch) Fernald. (*P. pusillus*) At least part of the material on the herbarium sheet is var. *tenuissimus*, the remainder may be closer to var. *polyphyllus* (Morong) Fernald.
9. Najas gracillima (A. Br.) Morong (*Najas indica* var. *gracillima*)
10. Glyceria acutiflora Torr.
11. Glyceria obtusa (Muhl.) Trin.
12. Glyceria pallida (Torr.) Trin.
13. Briza media L.
14. Hystrix patula Moench (*Asprella Hystrix*)
15. Trisetum spicatum (L.) Richter var. molle (Michx.) Beal (*Trisetum subspicatum* var. *molle*)
16. Cinna arundinacea L.
17. Sporobolus vaginaeflorus (Torr.) Wood
18. Oryzopsis pungens (Torr.) Hitchc. (*Oryzopsis canadensis*)
19. Oryzopsis asperifolia Michx.
20. Paspalum ciliatifolium Michx. var. Muhlenbergii (Nash) Fernald (*Paspalum setaceum*)
21. Panicum oligosanthes Schultes var. Scribnerianum (Nash) Fernald (*Panicum laxiflorum*)

[1] The binomial italicized and given in parentheses is that employed by Harris.

22. Scirpus hudsonianus (Michx.) Fern. (*Eriophorum alpinum*)
23. Eleocharis Smallii Britton (*Eleocharis palustris*)
24. Eleocharis tenuis (Willd.) Schultes
25. Eleocharis tuberculosa (Michx.) R. & S.[2]. Apparently this is the second report for New Hampshire, though the earliest collection (July 27, 1897).
26. Carex siccata Dewey
27. C. cephalophora Muhl.
28. C. exilis Dewey
29. C. angustior Mackenzie (*C. echinata* var. *microstachys*)
30. C. cephalantha (Bailey) Bicknell (*C. echinata* var. *cephalantha*)
31. C. Deweyana Schwein.; probably this species but specimen was immature when collected.
32. C. tenera Dewey (*Carex straminea*)
33. C. brevior (Dewey) Mackenzie (*Carex straminea* var. *brevior*)
34. C. umbellata Schkuhr
35. C. anceps Muhl.
36. C. debilis Michx. var. Rudgei Bailey
37. C. pallescens L. var. neogaea Fern. (*C. pallescens*)
38. C. Swanii (Fern.) Mackenzie (*Carex virescens*)
39. C. lanuginosa Michx. (*C. filiformis* var. *latifolia*)
40. C. comosa Boott (*C. Pseudo-Cyperus* var. *americana*)
41. C. vesicaria L. var. monile (Tuckerm.) Fern. (*C. monile*)
42. Spirodela polyrhiza (L.) Schleid.
43. Xyris caroliniana Walt.
44. Juncus militaris Bigel.
45. Allium Schoenoprasum L. var. sibiricum (L.) Hartm. (*Allium Schoenoprasum*)
46. Clintonia borealis (Ait.) Raf.
47. Habenaria clavellata (Michx.) Spreng. var. ophioglossoides Fern. (*H. tridentata*)
48. H. Hookeri Torr.
49. H. orbiculata (Pursh) Torr.
50. H. fimbriata (Ait.) R. Br.
51. Spiranthes vernalis Engelm. & Gray (*Spiranthes praecox*)
52. Goodyera repens (L.) R. Br. var. ophioides Fern. (*Goodyera repens*)
53. Myrica pensilvanica Loisel. (*M. cerifera*)
54. Boehmeria cylindrica (L.) Sw.
55. Paronychia canadensis (L.) Wood (*Anychia capillacea*)
56. Stellaria graminea L.
57. Ranunculus flabellaris Raf. (*R. delphinifolius*)
58. Hepatica americana (DC.) Ker. (*H. triloba*)
59. Anemone cylindrica Gray
60. Berteroa incana (L.) DC.

[2] Pease, A. S. Rhodora **26**; 37, 1924.

61. Camelina sativa (L.) Crantz
62. Sisymbrium altissimum L.
63. Barbarea vulgaris R. Br. (*Barbarea vulgaris* var. *arcuata*)
64. Cardamine pensylvanica Muhl. (*C. flexuosa*)
65. Pyrus melanocarpa (Michx.) Willd. (*P. arbutifolia* var. *melanocarpa*)
66. Pyrus aucuparia (L.) Ehrh. (*Sorbus americana*)
67. Crataegus succulenta Schrad. var. macracantha (Lodd.) Eggleston (*C. coccinea* var. *macracantha*)
68. Potentilla recta L. This weed, now abundant in central and southern New Hampshire, was first collected by Harris in 1915.
69. Potentilla simplex Michx. (*P. canadensis*)
70. Geum laciniatum Murr. (*G. virginianum*)
71. G. aleppicum Jacq. var. strictum (Ait.) Fern. (*G. album*)
72. Trifolium procumbens L.
73. Vicia tetrasperma (L.) Moench
74. Vicia angustifolia (L.) Reichard (*V. sativa* var. *angustifolia*)
75. Polygala sanguinea L.
76. Acalypha rhomboidea Raf. (*Acalypha virginica*) This is decidedly atypical material, but most closely resembles *A. rhomboidea.*
77. Euphorbia corollata L.
78. Callitriche heterophylla Pursh (*Najas flexilis*)
79. Rhus typhina L.
80. Vitis aestivalis Michx. var. argentifolia (Munson) Fernald (*V. aestivalis*)
81. Viola palmata L.
82. Decodon verticillatus (L.) Ell. var. laevigatus Torr. & Gray (*Decodon verticillatus*)
83. Myriophyllum tenellum Bigel.
84. Heracleum lanatum Michx.
85. Angelica atropurpurea L.
86. Cornus stolonifera Michx.
87. Chimaphila maculata (L.) Pursh
88. Moneses uniflora (L.) Gray (*M. grandiflora*)
89. Lappula echinata Gilibert (*Echinospermum virginicum*)
90. Myosotis stricta Link
91. Physalis heterophylla Nees. (*P. virginiana*)
92. Scrophularia lanceolata Pursh (*S. nodosa* var. *marilandica*)
93. Pentstemon hirsutus (L.) Willd. (*P. pubescens*)
94. Veronica officinalis L.
95. V. peregrina L.
96. Orobanche uniflora L. (*Aphyllon uniflorum*)
97. Eupatorium sessilifolium L.
98. Eupatorium rugosum Houtt. (*E. urticaefolium*)
99. Solidago puberula Nutt.

100. Solidago ulmifolia Muhl.
101. Aster cordifolius L.
102. Aster ericoides L. (*Aster multiflorus*)
103. Aster puniceus L.
104. Antennaria neodioica Greene
105. A. neglecta Greene
106. Bidens cernua L.
107. Tussilago Farfara L.
108. Senecio vulgaris L.
109. Cirsium muticum Michx. (*Cnicus muticus*)
110. Tragopogon pratensis L.
111. Taraxacum laevigatum (Willd.) DC. (*T. erythrospermum*)
112. Lactuca scariola L. var. integrata Gren. & Godr.
113. Prenanthes trifoliolata (Cass.) Fern.
114. Prenanthes altissima L.
115. Hieracium aurantiacum L.

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Hypericum adpressum Bart., forma **spongiosum** (Robinson), stat. nov. Var. *spongiosum* Robinson in Rhodora, iv. 136, t. 37, figs. 10 and 11 (1902).

This form or state, resulting from deep immersion in water, is surely not a geographic variety; but extreme plants, like the type-colony, with the heavily spongy lower half or third of the stem 2.5–4 or more dm. high, the total height of the flowering stem up to 1 m. and the leaves exceptionally broad and flat, is so strikingly unlike the relatively slender and narrower-leaved typical *Hypericum adpressum* that it is convenient to have a formal name for it.—M. L. Fernald.

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CONTENTS:

Change of Status for two Species of Chrysopsis. *R. K. Godfrey.* 113

New Missouri Plant-records (1946–1948). *Julian A. Steyermark.* 115

Cyperus brevifolius in Fairfield County, Connecticut, *Leonard J. Bradley.* 119

Physostegia Correllii. *Lloyd H. Shinners.* 120

Range of Kiaeria Starkei in Quebec. *James Kucyniak.* 122

Grasses of North Carolina (a friendly Critique). *M. L. F.* 124

New Moss from Nebraska. *Herbert Habeeb.* 128

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A CHANGE OF STATUS FOR TWO SPECIES OF CHRYSOPSIS

R. K. Godfrey

Chrysopsis gossypina (Michx.) Nutt., forma **decumbens** (Chapm.), stat. nov. *C. decumbens* Chapm. Flora of the Southern United States, 2nd Ed. 217 (1883); *C. arenicola* Alexander in Small, Manual of the Southeastern Flora, 1339 (1933).

There appear to be no differences in the flowers or fruits as between *Chrysopsis gossypina* and *C. decumbens.* The only observable difference between them is in the character of the pubescence of the peduncles and the involucres. *C. gossypina* has the peduncles and involucres densely cottony-lanate, whereas in *C. decumbens* they are glandular-pubescent. In a series of specimens one of these extremes grades imperceptibly into the other; furthermore, there seems to be no geographic segregation of the extremes. Specimens from a single county in the sandhills of South Carolina, for example, exhibit all the degrees of difference with regard to this characteristic.

Chrysopsis arenicola is, in my judgment, identical with what has been passing as *C. decumbens.* Dr. W. B. Fox and I collected specimens of a decumbent, cottony-lanate *Chrysopsis* in southern Wake County, North Carolina, last autumn (sandy ridge, very near the Wake-Harnett County line on the road between Fuquay Springs and Duncan, *Godfrey & Fox* 48674, Oct. 16, 1948) which, using Small's Manual, I identified as *C. arenicola.* According to Small the species was known only from the sandhills near Hartsville, South Carolina. Subsequently, in determining the identity of other collections of similar appearing plants from elsewhere,

I came to question the existence of *C. arenicola* as an entity distinct from *C. decumbens*. *C. decumbens*, moreover, on the basis of the differences outlined above, did not seem to be sufficiently distinct from *C. gossypina* to be maintained in the specific or the geographic-varietal category.

As for the identity of *Chrysopsis arenicola*, it would seem as though it may have been born of some taxonomic shenanigans. Small's key to the species of *Chrysopsis* (not including the grass-leaved members which he segregates as *Pityopsis*) is so constructed as to key out named sub-groups within the genus. Ordinarily one expects a subdivision of a genus to include species which have certain natural affinities that distinguish them as a group from another group of species with natural relationships. It takes little discrimination, however, to discover that in this case the groupings are of such nature as to violate the principle. Some of the most obviously closely related species fall into different subdivisions. This device serves nicely in the descriptive sequence of the species to keep apart entities which are uncomfortably similar in their characteristics. Thus does *C. arenicola* occupy place number 7 in the sequence, whereas *C. decumbens* is number 11.

For purposes of comparison there is given below the original description of *C. decumbens* and that of *C. arenicola:*

> This is Chapman's original description of *C. decumbens* which he had from St. Vincent's Island in W. Florida: "stems decumbent, simple, silky-villous; leaves villous, lanceolate-oblong, obtuse, entire, sessile, leafy in the axils; the lowest spatulate-oblong, clustered; heads large, in a loose corymbose panicle; the peduncles and involucre glandular-pubescent; rays about 25, showy; achenia hairy, furrowed; exterior pappus bristly."
> Alexander's description of *C. arenicola* which he had from South Carolina is this: "stem about 3 dm. tall, white cottony: blades of the cauline leaves various, the lower ones slightly broadened upward, 1–3 cm. long, the upper ones oblong-lanceolate to linear-lanceolate, auricled at the base, sessile, all white cottony-lanate: bracts of the involucre rather rough-glandular, the inner bracts narrowly linear, acuminate: achenes about 2 mm. long."

In the same treatment in which Alexander's original description of *C. arenicola* appears (Small, 1933), with glandular peduncles and involucres, *C. decumbens* has lost the glandular character of its peduncles and involucres and its bracts have become sparingly cobwebby! And is it not remarkable that we should find

that *C. arenicola* is keyed to the *Marianae* on the basis of its glandular involucre, while *C. decumbens* is keyed to the *Pilosae* on the basis of an involucre with cobwebby hairs!!

I have before me a co-type of *C. decumbens* and the type of *C. arenicola.* They are a perfect match. In view of all of the above considerations, I am considering *C. gossypina* as including plants not only with cottony-lanate involucres and peduncles, but with forms grading to an extreme having glandular involucres and peduncles, the latter, for the sake of convenience and clarity, to be regarded as a *forma*. *C. arenicola* is relegated to synonomy.

North Carolina State College, Raleigh

NEW MISSOURI PLANT-RECORDS (1946–1948)

Julian A. Steyermark

Since the last report on plants new to Missouri (Rhodora **43:** 658–663. 1941, and **44:** 248. 1942), continued intensive collecting in the state by Mr. Bill Bauer and the writer since the end of the last war has resulted in the discovery of a number of species new to the state. The following are all deposited in the Herbarium of the Chicago Natural History Museum.

Brachiaria extensa Chase. This is an unexpected addition to the flora of Missouri. It was previously recorded by Hitchcock in his Manual of the Grasses of the United States, p. 572, from Florida, Louisiana, Texas, Oklahoma, and Cuba. The present collection, *Steyermark 67054*, is from openings along ditch, along road E, sect. 8, 1¼ mi. east of Cooter, Pemiscot Co., October 23, 1948.

At first sight the plant has the appearance of a species of *Panicum* or *Paspalum.* In fact, on a collection by Elihu Hall (no. 814) in the Herbarium of the Chicago Natural History Museum, Engelmann noted "A paspaloid Panicum I cannot make out".

Scirpus etuberculatus (Steud.) Kuntze. Another unexpected discovery in Missouri, this species, hitherto supposed to be confined to the Coastal Plain from Delaware to Florida west to Louisiana, was found during the autumn of 1948 in one of the remarkable upland sink-hole ponds of southern Missouri. These ponds, nestling in the midst of a dry upland oak-hickory

forest, have apparently preserved a relic flora of by-gone coastal plain days when the Ozarks, preceding their last Tertiary uplifts, had been peneplained to a low swampy area. The nearest station for this species (Saratoga, Mississippi) is several hundred miles removed from that of the present collection, *Steyermark 66629*, Tupelo Gum Pond, T 25 N, R 4 W, sect. 4, 8 mi. west of New Liberty, Oregon Co., October 3, 1948. The culms are extensively creeping, have a gray-green or blue-green color, and, although rather sharply triangular above, are obtusely or obscurely triangular below.

Camassia scilloides (Raf.) Cory, forma **variegata,** f. nov., a typo recedit foliorum marginibus luteo-albidis.—Northwest-facing slopes, Pedelo Creek, T 27 N, R 19 W, sect. 6, 4½ mi. northeast of Sparta, Christian Co., Missouri, April 25, 1941, *Julian A. Steyermark 28324*, type, in Herb. Chi. Nat. Hist. Mus.

This form, with the leaves margined creamy-white, sometimes is found scattered within a colony of ordinary green-leaved wild hyacinth.

Trillium ozarkanum Palmer & Steyermark. Known previously in Missouri only from Barry County in the southwestern corner of the state, this species has been discovered in the southeastern part of the Ozarks by Mr. Bill Bauer in 1946 and there re-collected by the writer in 1947. It is represented by the following collection: *Steyermark 64262*, shallow draw in upland pine-oak-hickory woods on west side of highway 80, T 27 N, R 5 W, sect. 34, 2 mi. south of Birch Tree, Shannon Co., May 3, 1947. It is to be noted that both Missouri collections are located in shallow draws of upland woods where the soil is acid. In the Shannon County station it is associated with such acid-soil plants as *Tradescantia longipes*, *Pinus echinata*, and *Nyssa sylvatica* var. *caroliniana*.

Pogonia ophioglossoides (L.) Ker. This was first spotted in July, 1948, by Mr. Bill Bauer in Reynolds County, southeastern Ozark region. This remarkable find, made along a well-traveled highway, was taken, with *Alnus serrulata* var. *vulgaris* and *Salix caroliniana*, in a swampy meadow, bordering a spring-branch tributary to Middle Fork of Black River, along highway 21, T 32 N, R 1 E, sect. 15, 1.8 mi. southwest of Middle Fork bridge, about 3 mi. northeast of Centerville, July 4, 1948.

This adds another of the more northern-ranging species to the list of plants inhabiting the swampy meadows of the southeastern part of the Ozarks. Others, such as *Liparis Loeselii*, *Menyanthes trifoliata* var. *minor*, *Pedicularis lanceolata*, and *Aster puniceus* var. *lucidulus* have already been noted by the writer previously.

HEUCHERA PUBERULA Mack. & Bush, forma **glabrata,** f. nov., a typo differt foliis subtus pallide viridibus et glabratis; petiolis et scapis glabratis vel parce pilosulis.—North-facing base of limestone bluffs, at Jam Up Bluff along Jack's Fork of Current River, T 27 N, R 6 W, sect, 5, 4 mi. north of Teresita, 6 mi. northwest of Monteer, Shannon Co., Missouri, October 2, 1948, *Julian A. Steyermark 66615*, TYPE, in Herb. Chi. Nat. Hist. Mus.

Typical *H. puberula* has the lower surface of the leaves and the petioles and scapes densely pubescent; moreover, the lower leaf surface is usually of a dull lavender color. The newly described form was growing near typical *H. puberula.*

DECODON VERTICILLATUS (L.) Ell. Another discovery made in an upland sink-hole pond, and not previously recorded for Missouri, is the following collection: *Steyermark 64404*, Bowles Pond, in upland tributary to Bowles Hol, tributary to Harrison Valley, T 31 N, R 1 E, sect. 23, 2½ mi. northwest of Redford, Reynolds Co., May 30, 1947.

Isolated in a densely forested part of the southeastern Ozark area, this sink-hole pond was inhabited by *Carex decomposita*, *Glyceria acutiflora*, *Isoetes Engelmanni*, *Dulichium arundinaceum*, *Hottonia inflata*, and several other characteristic species.

JUSSIAEA LEPTOCARPA Nutt., var. GENUINA. In his "A Revision of the New World Species of 'Jussiaea'", Munz cites a collection of *J. leptocarpa* var. *genuina* presumably made in Missouri, "in civitate Missouri, *Frank* in 1837" (Darwiniana 4, no. 2–3. p. 256. 1942). Such an indefinite locality threw doubt as to the actual occurrence of the plant in Missouri. But, late in October, while botanizing along mudflats of the Mississippi River in extreme southeastern Missouri, opposite the Tennessee line, the writer chanced upon isolated plants, which upon subsequent study prove to belong to this species. Thus, after 101 years, it may definitely be added to the flora of the state. A species known in the United States previously from Georgia, Florida, Alabama, Mississippi, Arkansas, and Texas, it ranges

southward in tropical regions from Mexico and the West Indies through Central America to Argentina and Peru in South America. The new Missouri collection, the first definite one to be recorded, is *Steyermark 67032*, mudflat along Mississippi River, Island no. 17, T 17 N, R 14 E, sect. 36 and 1, 3–4 mi. southeast of Caruthersville, Pemiscot Co., October 23, 1948.

Linaria minor (L.) Desf. First found, new to the state, by Mr. Bill Bauer along railroad tracks in 1946 in Pike and Audrain counties. Additional collections are *Steyermark 64575*, along railroad along highway 5, between Lemons and Unionville, Putnam Co., June 21, 1947; ballast-land at South Liberty, Clay Co., June 26, 1947, *Harold E. Hurst 39* (Herb. Wm. Jewell College); same locality, June 25, 1947, *Cyril Lee Broussard* (Herb. Wm. Jewell College).

Ruellia pedunculata Torr., forma **Baueri,** f. nov., a typo differt corolla alba.—In colony, Koester, St. Francois Co., Missouri, June 20, 1948, *Bill Bauer*, type, in Herb. Chi. Nat. Hist. Mus.

This white-flowered form is named in honor of Mr. Bauer of Webster Groves, Missouri. During the past several years he has contributed considerably to the botanical exploration of the state.

Oldenlandia Boscii (DC.) Chapm. Previously known from Virginia to Florida, west to Tennessee, Arkansas, and Texas, it is now recorded from the southeastern lowlands of Missouri: *Steyermark 66958*, exsiccated depression, T 22 N, R 4 E, sect. 36, 4 mi. south of Naylor, Ripley Co., October 20, 1948.

Valeriana pauciflora Michx. Mr. Bill Bauer collected a specimen of this species in 1946. The specimen, blooming in his wild flower garden, was claimed by him to come from Big Creek, Lincoln County, Missouri. Repeated trips made to re-locate the species at this station have failed, thus far. The collection is: *Bauer 11279*, alluvial woods along Big Creek, T 48 N, R 1 W, sect. 25, 6½ mi. south of Troy, Lincoln Co., April 21, 1946.

Asa Gray, in Syn. Fl. N. Am. **1**²: 44. 1884, cites this species from Missouri. Tracy included it, apparently on the basis of Dr. Gray's reference, in his "Catalogue of the Phaenogamous and Vascular Cryptogamous Plants of Missouri", p. 39, 1886. As far as known, no past Missouri specimens are extant, and the present Bauer collection has yet to be verified.

ASTER EXILIS Ell. This species, which ranges through the American tropics, may now be added to the flora of Missouri on the basis of the following recent collections: *Steyermark 67051*, open places along shallow ditch along road E, 1½ mi. east of Cooter, sect. 8, Pemiscot Co., October 23, 1948; *Steyermark 67075*, open places near house bordering field, T 16 N, R 18 E, sect. 15, 3 mi. west of Hermandale, Dunklin Co., October 23, 1948.

ASTER ANOMALUS Engelm., forma **albidus,** f. nov., a typo differt ligulis albidis.—Cherty wooded slopes, Natural Bridge Hollow, T 22 N, R 26 W, sect. 17 and 18, 8–9 mi. southeast of Cassville, Barry Co., Missouri, September 24, 1947, *Julian A. Steyermark 65135*, TYPE, in Herb. Chi. Nat. Hist. Mus.

This white-rayed form was growing with plants showing the usual lavender color.

ASTER PILOSUS Willd., forma PULCHELLUS Benke. The following collection, *Steyermark 67052*, openings along ditch along road E, 1¼ mi. east of Cooter, Pemiscot Co., October 23, 1948, has lavender rays and conspicuously pubescent stems and leaves. Benke's collection, based on an Indiana plant with rose-red rays and sparsely hirsutulous stems and leaves (RHODORA **34:** 11. 1932), is somewhat different from the Missouri collection in the color of the ray-flowers and in the lesser amount of pubescence. Inasmuch as variation in the degree of pubescence and intensity of lavender color might be expected within a given form, I am referring the Missouri collection to the form described by Benke.

CHICAGO NATURAL HISTORY MUSEUM

CYPERUS BREVIFOLIUS IN FAIRFIELD COUNTY, CONNECTICUT.—On May 4, 1948, the writer discovered a large and flourishing colony of a strange sedge, in the Fairchild Garden section of the National Audubon Society, of Greenwich, Connecticut. This sedge has been identified as *Cyperus* (*Kyllinga*) *brevifolius* (Rottb.) Hassk., not hitherto known from north of the Philadelphia area. It grows in an open, weedy area, in company with such plants as *Solidago patula*, *Mimulus ringens*, *Polygonum sagittatum* and *Leersia oryzoides*. The soil is extremely wet in

spring, and is kept moist throughout the summer by a heavy, clay sub-soil. The sedge spreads chiefly by its long, creeping rootstocks, which produce new shoots at intervals of 1 to 2 centimeters. It is particularly prevalent, to the exclusion of all other growth, in a foot-path, about 3 feet wide, which is periodically mowed.

The Fairchild Garden, 125 acres in extent, was acquired in 1935 by the National Audubon Society. Prior to this time, it was maintained by Benjamin Fairchild, over a period of 50 years, as a private wild-flower sanctuary. During this long period, he introduced flowering plants and shrubs from Georgia to Maine, planting them in natural situations which seemed to suit their particular requirements. Maintenance consisted in keeping the requirements static by the elimination of brushy growths and other aggressive plants.

With these introduced plants have come many accidental introductions. *Galium concinnum* grows, and flowers freely, but produces little fruit. *Houstonia purpurea* is spreading over a large area. *Euphorbia corollata* is well established. *Carex trichocarpa* is known to have come in with *Lythrum Salicaria* from the Hudson River Valley, and now covers several acres of swampy land. This historical background probably explains the occurrence of *Cyperus brevifolius.*

The writer is indebted to Mr. C. A. Weatherby, of the Gray Herbarium, for the identification of, and information about this species.

Specimens have been deposited in the Gray Herbarium, the Herbarium of the Connecticut Botanical Society, at Yale University and the Herbarium of the Audubon Nature Center, at Greenwich, Conn.—Leonard J. Bradley, Audubon Nature Center.

Physostegia **Correllii** (Lundell), comb. nov. *Dracocephalum Correllii* Lundell, Wrightia **1:** 165. 1947.—The author of the new species first assigned it to the genus *Physostegia* in manuscript, but substituted *Dracocephalum* in deference to the opinion of Elizabeth McClintock, who has recently annotated numerous herbarium specimens under the latter genus. This accords with the treatment in Small's *Manual of the Southeastern Flora* (1933),

which in turn followed the unfortunate proposal by adherents of the American Code to make the first species listed by Linnaeus the type for its genus. Remnants of this same proposal crept into the proposed list of type species by Hitchcock and Green, published as a supplement (not an integral part) of the International Rules. There *Dracocephalum virginianum*, the first of the species listed by Linnaeus, is given as "species lectotypica." Happily this supplement is in no way binding, and is a list of suggestions only. Many of the suggestions show lack of knowledge of the genera for which types are proposed; some are quite unacceptable. For example, *Aster Amellus* is offered as the type of its genus. This Eurasian species (known in the United States in several horticultural forms) was not considered one of the *Asteres Veri*, subgenus *Euaster*, or equivalent group by any of the leading students of the genus—Nees, De Candolle, Gray, Bentham (in Bentham and Hooker, largely following Gray), Hoffmann (in Engler and Prantl, largely following Bentham and Gray); and the circumscription of subgenus *Euaster* by these authorities has been unanimously followed by other authors dealing only with American species—Nuttall, Burgess, Small, Rydberg.

To make *Dracocephalum virginianum* the type of its genus would likewise mean abandonment of the unanimous usage of Bentham, Gray, Chapman, Small (prior to 1933), Britton and Brown, Robinson and Fernald, L. H. Bailey, and more recently of Fassett, Fernald, Deam, and G. N. Jones, as well as the equally unanimous usage of seedsmen and nurserymen both in the United States and abroad. I can see no justification for the replacement of *Physostegia* Benth. by *Dracocephalum* L.[1]

Physostegia Correllii is a perennial producing rhizomes, in the manner of the cultivated plants assigned to *P. virginiana* (L.) Benth. or *P. speciosa* Sweet. Most of the species native to Texas

[1] This case was clearly presented (along with many others in which lack of understanding of the plants was too evident in the typifications by Hitchcock and Green) by Rehder and me when we were members of the Special Committee on the Nomenclature of the Phanerogamia and Pteridophyta appointed at Cambridge in 1930. The fact that the British Chairman of the Committee refused to accept our careful analyses was indicative of an attitude which was not wholly constructive. Fortunately, I am informed, the proper typification of *Dracocephalum* and numerous other Linnaean genera, has been again proposed to the present Commission on Nomenclature, as implied in Weatherby's footnote 50a in the unofficial edition of the International Rules in Brittonia, vi. 115 (1947).—M. L. F.

are annuals—*P. Digitalis* Small, *P. intermedia* (Nutt.) Gray (authorship incorrectly given in *Index Kewensis* as "Engelm. & Gray"), and *P. angustifolia* Fernald. Occasional specimens show slight development of a rhizome-like extension of the stem, but this I suspect is the result of burial under mud in spring. In central and eastern Texas, to which the genus is largely restricted, "gully-washers" are the rule at that season.—Lloyd H. Shinners, Southern Methodist University, Dallas.

THE RANGE OF KIAERIA STARKEI IN QUEBEC

James Kucyniak

The long-awaited appearance of Professor Wm. C. Steere's important contribution to arctic and circumboreal botany, [*Musci*, Nat. Mus. of Can. Bull. No. **97:** 370–490. 1947] affords the author the opportunity to re-examine the distribution of *Kiaeria Starkei* (Web. & Mohr) Hagen in Quebec.

In his paper, Dr. Steere lists *K. Starkei* as a circumboreal species which in North America extends southwards to the northernmost tier of United States. The moss has so far proven to be of infrequent occurrence. Material only from the southernmost portion of the area which Dr. N. Polunin [*Botany of the Canadian Eastern Arctic. Part I.* Nat. Mus. of Can. Bull. No. **92:** 1. 1940] defined as the Canadian Eastern Arctic was examined, viz., two collections made by Polunin: Wolstenholme (Northernmost Quebec) and Burwell (Northern Labrador).

An interpretation of the plant's distribution based upon the localities given by Dr. Steere, contrasted with the range which Abbé Ernest Lepage attributes to it in Quebec, creates what appears to be still another problem in plant distribution. Listing the Quebec records of *K. Starkei* under *Arctoa Starkei* (Web. & Mohr) Grout, Abbé Lepage [*Les lichens, les mousses et les hépatiques du Québec . . .* Le Nat. Can. **72:** 315. 1945] sets aside as doubtful two early reports: the Mt. Albert (Gaspé County) collection made by John Macoun and that from Manicuagan River, Summit Lake (Saguenay County) by A. P. Low in 1895. However, he considers valid three collections reported by F. Marie-Anselme from the following localities: Waterloo (Shefford

County), Pont Rouge (Portneuf County) and La Malbaie (Charlevoix County).

Through the kindness of Mr. William K. W. BALDWIN of the National Museum, Ottawa, the author has had on loan the Quebec specimens listed by Professor John MACOUN [Cat. of Can. Pl. Part **VI:** 23. 1892 and Part **VII:** 192. 1902] under *Dicranum Starkei* and has been able to check the determinations. MACOUN's collection from Mt. Albert, bearing an abundance of sporophytes, remains to the best of the author's knowledge as named. The Low specimen from Summit Lake, however, has the costa composed of heterogenous cells and consequently does not come under *Kiaeria Starkei.* Dr. STEERE, who has re-examined the material, informs the author that it is *Dicranum fuscescens* Turn.

The author has examined the four specimens labelled *Dicranum Starkei* in the MARIE-ANSELME herbarium with the result that not one of the four specimens determined as such belongs here.

Specimen *No. 1947* from Waterloo, collected on October 30, 1937, is *Dicranum scoparium* Hedw. There are several strands of *Heterophyllium Haldanianum* (Grev.) Kindb. and *Drepanocladus uncinatus* (Hedw.) Warnst. var. *typicus* Wynne mixed in with it.

The Pont Rouge material, *No. 2739*, after examination proved to be *Timmia austriaca* Hedw. with shreds of *Myurella Careyana* Sull. running through macroscopically Bartramia-like material.

The collection from La Malbaie in the lower St. Lawrence river region, *No. 3667*, is *Blindia acuta* (Hedw.) Bry. Eur.

A fourth collection found in the herbarium, though not recorded in the Lepage list, the label of which reads "Lac Bowker, comté de Shefford: à terre; 21 août 1937; F. Marie-Anselme, *1684*", more appropriately belongs to *Dicranum Bonjeani* DeNot.

In concluding, it may be assumed that in Quebec only two stations for *Kiaeria Starkei* are known to date: Mt. Albert (Gaspé County) and Wolstenholme (Northernmost Quebec).

The author is indebted to Dr. STEERE, Mr. BALDWIN and F. FABIUS, s. c., through whose generous assistance he has been able to throw some light on another problem in plant distribution.

MONTREAL BOTANICAL GARDEN.

Grasses of North Carolina (a friendly Critique).—Under the title, The Grasses of North Carolina[1], a very attractive volume has been received for review, "with the request that in notices or reviews attention be called to the price". How could one help noting \$7.50 for a book of only 276 pages (including a few blanks), the price so in contrast with the more modest charges for much larger and more comprehensive volumes covering a vastly greater area? Those who can raise the money will have a well printed and attractively illustrated book, with reproductions from photographs of overfed (on grass) cattle, "balds", savannas, some of the more conspicuous grasses and beautifully drawn small line-illustrations of many of the species and, perhaps of most interest to students of different or adjacent areas, 298 small maps showing the counties in which most of the accepted species are known, at least to the author. There are excellent keys, including one based on vegetative characters, this with drawings of leaf-bases, sheaths, ligules, etc. of a few species, but, rather strikingly, not of rhizomes and bases.

In recognition of species the evaluations in Hitchcock's *Manual of the Grasses of the United States* (1040 pp., 1696 wonderfully fine figs. for \$1.75) are largely accepted but a few not known to Hitchcock, including one described by the reviewer, are admitted; but many later studies by those who have demonstrated that the actual types, when examined, lead to different interpretations, are passed by or in some cases dismissed as not acceptable, although with an apology like: "Judging from a photograph of the type [the photograph published by the present reviewer], there seems to be some justification for this opinion". What more than a revealing photograph of the type is needed? If the actual types and the original descriptions agreeing with them are discarded as of no account, what basis is there which can lead to stability?

But so faithfully does the author accept the Washington verdict, right or demonstratedly wrong, that he "has drawn freely from Professor Hitchcock's *Manual*". The freedom in drawing from the work of another is exemplified in some of the keys, for instance under *Paspalum*, where word-for-word passages are taken over, without even the simple changes which the copyrighting and very high pricing of the new book would suggest as desirable. Such passages as these could readily have been so stated, after full understanding of the plants, as to avoid essential imitation:

"Blades conspicuously ciliate, otherwise nearly glabrous.
Blades relatively short, rounded at base and recurved-ascending; foliage aggregate toward the base, the upper culm relatively naked; spikelets glabrous, mostly 1.5–1.6 mm. long."—*Hitchcock*, p. 577.

"Blades conspicuously ciliate, otherwise glabrous or nearly so, relatively short; rounded at base; foliage aggregate toward the base, the upper culm slender and relatively naked; spikelets 1.5 to 1.6 mm. long, glabrous."—*Blomquist*, p. 125.

There are available synonyms for "conspicuously", "nearly", "relatively", "aggregate", etc. which could have been used; for, when a volume (Hitchcock's Manual), prepared at great expense with federal funds collected from the country's taxpayers and distributed gratis or at a low price to all who need it, has leading phrases taken over directly into a copyrighted and forbiddingly priced and much smaller book, some questions must arise at least as to complete originality of the work and its copyrighting.

A "notice" might stop with these three paragraphs and then add the "release" sent out by the publishers with the assertion that the new book "includes the majority of the grasses of the eastern United States . . . 360 species and varieties"; but immediately one's curiosity is aroused, for the

[1] *The Grasses of North Carolina* by H. L. Blomquist, Professor of Botany, Duke University. vi + 276 pages, 249 figs., 298 small maps. Durham, N. C. Duke University Press, 1948. \$7.50

reviewer has recently sent to the printer a large volume covering the flora of temperate eastern North America north of North Carolina, Tennessee and Arkansas and south of the Labrador Peninsula and the north shore of Lake Superior, with about 650 grasses recognized in the area south of Canada. In view of the fact that in the southeastern United States, south of Virginia and Kentucky, Small admitted 180 additional species, we get a total in the "eastern United States" of about 830 recognized grasses, of which 360 is scarcely a majority. It, therefore, seems important to learn why a book produced through financial assistance both in assembling the matter and in its publication (acknowledged on p. vi) is put on the market at a price which approaches that of Small's privately issued *Manual*, with 1554 pages of smaller type and with more than 1500 analytical drawings of generic details. Immediately one checks to determine the completeness of the new book and its recognition of the records of earlier and cautious workers on the flora of North Carolina; and, although the author has himself been assiduous in collecting and studying the grasses of portions of his state, it is disappointing to find in the new book no obvious mention of the earlier great students of the North Carolina flora: for instance, such a distinguished former leader in botanical research in the state as HARDY BRYAN CROOM (1797–1837) who, while living in Craven County, prepared his detailed and posthumously published *Catalogue of Plants, native or naturalized, in the Vicinity of New Bern, North Carolina* (1837). Croom, a Corresponding Member of the Academy of Sciences of Philadelphia, and of the New York Lyceum of Natural History, sent or took his more critical plants to Torrey and they are presumably preserved in the Torrey Herbarium; and Torrey perpetuated his memory by the genus *Croomia*, while the famous genus *Torreya* was based by Arnott on material discovered by Croom in Florida. The North Carolina records of such a careful botanist of "charming personality and scholarly attainments"[2] should not be neglected. MOSES ASHLEY CURTIS (1808–1872), perhaps the most distinguished botanist of North Carolina, member of the American Philosophical Society and honorary member of many other learned societies and academies, published a *Catalogue of the Plants growing spontaneously around Wilmington, North Carolina* (1835), a *Catalogue of the Indigenous and naturalized Plants of the State* (1867) and many papers recording new discoveries. It is too bad to have neglected his careful records. THOMAS FANNING WOOD (1841–1892) LL.D. hon., Univ. N. C., and MICHAEL GERALD MCCARTHY (1858–1915), who for 20 years was "state botanist" and who, in checking identities, used to visit the Gray Herbarium and other large northern collections, cooperated in 1887 in publishing on the flora of Dr. Wood's home-town, Wilmington. Many of their records would have made important additions to the new book, for in all or nearly all cases they were of unmistakable species.

Croom's enumeration would have supplied records for Craven County not indicated on the maps: *Melica mutica, Sporobolus clandestinus, Zizania aquatica, Amphicarpon Purshii*, etc. Curtis's Wilmington list would have suppled dots for a county sixty to one hundred miles from the nearest one indicated for *Festuca obtusa, Anthoxanthum odoratum, Hydrochloa caroliniensis*, etc.; while the Wood and McCarthy enumeration for Wilmington would have supplied extensions of indicated range for 24 species and it recorded 3 species of grasses

[2] As showing the difference between the usages of the "scholarly" Croom and the writing of English names too often found in the work of many who lack feeling for careful grammatical construction, witness the following. In Croom's *Catalogue: Umbrella-tree, Venus' Fly-trap, Red maple, Touch-me-not, Wood-sorrel, Rattle-box, Wild Indigo, Wild oats, Broom-grass, Rice-grass*, etc., with evident feeling for the careful use of hyphens to indicate grammatical construction. In *Grasses of North Carolina:* FOWL MANNAGRASS, ORCHARD GRASS, CRESTED DOGTAIL GRASS, WILDRICE, OATGRASS, GOOSE-GRASS, SWEET VERNALGRASS, and TOOTHACHE or ORANGE GRASS. One would prefer to chew ORANGE-GRASS (because of the fragrance of the bruised bases) instead of TOOTHACHE.

not in the new book: *Agrostis verticillata*, *Aristida spiciformis* (cited by Hitchcock from South Carolina) and *Cenchrus myosuroides*. Nuttall's *Paspalum racemulosum*, reduced by Mrs. Chase to *P. bifidum*, was from "Florida to North Carolina", although she stated the northern limit as in South Carolina. In Curtis's *Catalogue* of 1867 this unique and unmistakable species was indicated (p. 65) for the breadth of the state: "Coast to Cherokee". Since the species is found over the line, in dry sandy woods of Sussex County, Virginia, Curtis's record can hardly be assumed to have been wholly erroneous, at least without further evidence; and his *P. praecox* from "Low. Dist. to Wake." gives an extension of local range, while his *P. fluitans* (one of the cases in which the taxonomic facts are apparently distasteful to the author of the book) from "Lincoln Co." gives something more tangible than "is to be expected in North Carolina". If all other species "to be expected in North Carolina" had been included as numbered species the score would more nearly approach the "majority" above noted.

Other publications on the flora of North Carolina, if taken into account, would add to the records. Thus, Kearney's *Report on a Botanical Survey of the Dismal Swamp Region* records *Zizania aquatica* from near Edenton, this species indicated by Blomquist from only the two southernmost coastal counties, 150 miles away, but recently collected near Edenton by *Godfrey*, no. 5337 (in Gray Herb.). Much later, in Peattie's *Flora of the Tryon Region* (1928–1931), more than 40 grasses would have supplied dots (now missing) for Polk County in the Blue Ridge and one species not noted in the new book. Incidentally, in Am. Journ. Sci. ser. 2, vii. 410 (1849) Curtis cited *Polypogon monspeliensis* from "coast of N. Car. as far north at least as Ocracoke Inlet!" That was a sufficient statement to justify a dot (now missing) on map 94 at the outer and southernmost corner of Hyde County. Very much earlier, as far back as 1812, important records from North Carolina were made. Under *Leersia lenticularis*, Professor Blomquist, recording the only North Carolina station known to him, in Carteret County, stated that the voucher has not been located. But nearly a century and a half ago Frederick Pursh recorded it from northeastern North Carolina, a fact familiar to Curtis, who cited Pursh's locality. In his Fl. Am. Sept. i. 62 (1814) Pursh wrote: "Illinois and Virginia . . . This singular and elegant grass I found on the islands of Roanoak river in North Carolina, and observed it catching flies in the same manner as *Dionoea muscipula:* the valves of the corolla are nearly of the same structure as the leaves of that plant. I communicated specimens with this particular circumstance to Dr. B. S. Barton of Philadelphia, who has made mention of it in a paper on the irritability of plants". Barton's note was in his paper, *Desultory Observations concerning certain vegetable Muscicapae* in Tilloch's Phil. Mag. xxxix. 108 (1812): "The grass to which I allude is the *Leersia lenticularis* . . . The plant is a native of marshy grounds of the Illinois country, of Virginia, North Carolina &c". Here, of course, was the origin of the name "Catch-fly grass". Barton and Pursh knew the plant also from Virginia, although Hitchcock did not recognize it in the East from north of South Carolina; but it is very abundant on many bottomlands of southeastern Virginia, thence northward into Maryland! The bottomlands of the Meherrin, Nottoway and Blackwater systems are often filled by it, and the bottomlands of these rivers, passing into northeastern North Carolina, must surely have it.

This note on the old records of *Leersia lenticularis* in northeastern North Carolina inevitably leads to the observation that about half the maps in the new work have no indication of species as found in the northeastern or even the eastern (Coastal Plain) section of the state; and that, except for the Wilmington region, most recent North Carolina botanists have largely clung to the Piedmont and the Blue Ridge. So very many of the plants, unrecognized as growing in northeastern North Carolina, occur just over the line in southeastern Virginia that it is most difficult to imagine them sharply discriminating

against adjacent North Carolina: *Poa paradoxa, P. Chapmanniana, P. cuspidata, Eragrostis hypnoides, Uniola latifolia, Melica mutica, Agrostis Elliottiana, Cinna arundinacea, Alopecurus carolinianus, Aristida oligantha, A. lanosa, Leersia hexandra, Paspalum lentiferum, Panicum yadkinense, P. caerulescens, P. Wrightianum, P. hians, Cenchrus incertus, Sorghastrum Elliottii*, etc., etc. In fact, one such species, as above noted, was secured by Kearney and by Godfrey. Some others, slightly closing gaps, these noted from labels in the Gray Herbarium, are the following: *Poa cuspidata* from west of Fairfield, Tyrrell Co., *Godfrey*, no. 3917; *Sphenopholis filiformis* from Raleigh, Wake Co., *Godfrey*, no. 3559, and from Delgado, New Hanover Co., April 21, 1923, *J. R. Churchill; Sporobolus clandestinus* from Wyanoke, Gates Co., *Fernald & Long*, no. 11,524; and *Ctenium aromaticum* from Pinehurst, Moore Co., July 1897, *Otto Katzenstein*, and from Pine Bluff *Wiegand & Manning*, no. 337, also from 7 miles southwest of Wilmington, in Brunswick Co., *Godfrey*, no. 4134.

Close to the Carolina line (from a few rods up to 10 miles away) and on river-systems flowing through eastern North Carolina there are many species not yet recorded from the latter state. These suggest some worth-while botanizing: *Bromus nottowayanus* Fern. (characteristic of bottomland of the river which, uniting with the Blackwater, forms the Chowan in North Carolina); *Glyceria arkansana* Fern., positively dominant on bottomland of the Meherrin River system east of Emporia, Virginia, the Meherrin winding back-and-forth along the state line in Northampton County, North Carolina, and finally crossing Hertford County; *Eragrostis multicaulis* Steud. (*E. peregrina* Wieg.), a characteristic weed of roadsides, paths and railroads, which has presumably been carried by vehicles south of Franklin, Virginia; *Triodia Chapmani* (Small) Bush, a beautiful species of pineland from Southampton to Princess Anne County, Virginia, sometimes, as at Factory Hill in Nansemond, only a stone's throw from Gates County, North Carolina[3]; or *Muhlenbergia brachyphylla* Bush, characteristic of flat pinelands of southeastern Virginia and, like *M. glabriflora*, a plant primarily of the Mississippi Basin but with isolated stations on the Coastal Plain or in the Piedmont. Unfortunately this eastern isolation of *M. glabriflora* got wholly obscured in the new book on North Carolina grasses, for, although as yet known east of the Mississippi drainage at only one station in Maryland, one in Brunswick County, Virginia, and another in Durham County, North Carolina, the broad range is here given as "Newfoundland to British Columbia, south to North Carolina, Kentucky, Oklahoma, and Arizona". Hitchcock, in his *Manual*, had more accurately said "Low woods, Maryland, Indiana, Illinois, Missouri, and Texas", although his map 773 had no dot for Maryland. The evident source of the newly stated range (with North Carolina substituted for Maryland) is Hitchcock's statement of range for what proves to be a bi- or tripartite species, *M. racemosa* sensu Hitchcock: "Newfoundland to British Columbia, south to Maryland, Kentucky, Oklahoma, and Arizona".

The upshot seems to be, that there is very much close work remaining to be done, especially on the Coastal Plain of northeastern North Carolina, before anything truly approaching a complete list of plants of the state and their distribution can be made. The discriminating worker, exploring all types of habitat from the lower Roanoke to the coast from False Cape southward, should quickly add to the known flora of the state many of the 65 grasses of adjacent Virginia not recorded from North Carolina, more than two score of sedges similarly known, and many scores of showier plants. These, if he follows the traditional practice of scientists for many decades, he will record in appropriate journals in his field, as a report of progress. The results would then reach those really prepared to use them, for most scientific workers are not so endowed as to pay an unusually high price for obviously incomplete work.

[3] At the last moment *Elymus riparius*, found near the state-line in Virginia, is removed from these few examples because Hitchcock definitely cites and maps it from North Carolina.

The reviewer makes the above criticisms and suggestions in all friendliness for an active and coöperative fellow-worker and with full realization of the errors which too often make their way into his own work. He is not alone, he finds, in regretting that a handsome and expensive book should have been published without more thorough examination of the flora of a mostly neglected portion of the state and without full appreciation of the work done by earlier students of the North Carolina flora. The painstaking examples of such distinguished masters as Croom, M. A. Curtis, Wood and McCarthy, remote from large collections for comparison but achieving outstanding results, should inspire us all.—M. L. F.

A New Moss from Nebraska.—Pterigoneurum subsessile (Brid.) Jur., var. **Kieneri,** var. nov. A forma typica differt: lamellis foliorum humilibus; capsula unacum pedicello decidua, ut in *Phascaceis,* tandem ad sporulas emittendas disrupta, operculo basi minima non deciduo (calyptra cucullata?).—Nebraska: *Kiener* 10627 (in part).

The plants in this collection are of two forms. One is nearly typical. The other, var. *Kieneri,* possesses an altogether different type of sporophyte, in having a capsule with a non-dehiscent lid; and the seta, capsule and lid often fall as one, the seta having broken away near its base. The spores are liberated through rupture of the capsule-wall. The calyptra seems to be cucullate.

This condition, of a species or group of closely related species having in some instances a persistent and in others a deciduous operculum, is not unusual, for past authors have made special note of it, especially with *Hymenostomum rostellatum* (Brid.) Schimp. Some authors place the forms in separate genera, while others lump them into one species.

The novelty described above was found in a set of Nebraska mosses sent to the writer for determination by Dr. Walter Kiener.—Herbert Habeeb, Grand Falls, New Brunswick.

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CONTENTS:

Notes on Distribution of North Carolina Plants—I.
William B. Fox and R. K. Godfrey. 129

Plants New to Illinois or to the Chicago Area in Illinois.
Julian A. Steyermark and Floyd A. Swink. 147

Populus: a Correction. *Ernest Rouleau.* 149

Carya ovata and Carya glabrata in Durham, New Hampshire and Vicinity. *A. R. Hodgdon and Dominic P. Gangi.* 150

Death of Charles Alfred Weatherby. 152

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NOTES ON DISTRIBUTION OF NORTH CAROLINA PLANTS—I

WILLIAM B. FOX AND R. K. GODFREY

THE collections of the plants cited herein were, for the most part, made during the growing seasons of 1947 and 1948. Plants included may be placed in three categories: *viz.*, those believed to have been previously unreported for North Carolina, those previously reported but for which there are no documenting specimens in the larger herbaria in the state, and those the range of which is extended within the state. We have not made an exhaustive search of the larger herbaria outside the state but have based our observations on the literature at our disposal and upon an examination of the respective herbaria of the University of North Carolina, Duke University, and North Carolina State College. Specimens cited here are deposited in the herbarium of the last mentioned institution, unless otherwise indicated. It is believed that, though a thorough search of other herbaria might yield specimens that would have some bearing on the knowledge of the distribution in North Carolina of some of the species included, the records cited here will be of value to persons interested in the flora of North Carolina and to monographers of any of the groups involved.

Infrequently used references, to journal papers, etc., are cited in parentheses in the text, and these are not included in the appended bibliography. Other references, to manuals and monographs, are cited by the authors' names and date of publication, and these are listed in the bibliography. The genera

listed follow the order in Gray's Manual, 7th ed., and within genera the species are listed alphabetically.

We wish to express here our appreciation to members of the botany departments of the University of North Carolina and Duke University, respectively, for frequent use of their facilities.

Rhynchospora Baldwinii Gray. Brunswick County: roadside ditch, margin of wire-grass savanna, along Caswell Beach road near Inland Waterway, June 20, 1948, *Godfrey* 48208.

This is a fourth station in southeastern North Carolina, the northern limit of the range for the species. Gale (1944) cites specimens from Onslow, Pender, and New Hanover Counties.

Rhynchospora debilis Gale. Onslow County: grass-sedge savanna, 2.5 miles south of Maysville on U. S. Rt. 17, July 3, 1948, *Godfrey* 48302.

Gale (1944), when describing *R. debilis*, had a good representation of specimens from southeastern Virginia, only three from North Carolina, few from the other states in its range southward to Florida and Alabama. Those she cites from this state are from Hyde and Carteret Counties, and one of Curtis' from an unknown locality.

Rhynchospora divergens Chapm. Carteret County: excavated area in wire-grass savanna, 3 miles southeast of Newport, along U. S. Rt. 70, June 15, 1948, *Godfrey* 48195; Columbus County: exsiccated, shallowly excavated area in wire-grass savanna, 3 miles northwest of Old Dock, along N. C. Rt. 130, September 4, 1948, *Godfrey* 48486.

Range extended northward from South Carolina, the general range, according to Small (1933), being from S. C. to Fla. and La., on the coastal plain.

Rhynchospora gracilenta Gray. Pamlico County: in a cane-brake shrub-bog, between N. C. Rt. 306 and the Neuse River, 2.5 miles southwest of Arapahoe, July 1, 1948, *Godfrey* 48276; Bladen County: depression in savanna, 5 miles north of White Lake, July 7, 1946, *Blomquist* 13925 (in herb. Duke); Wake County: sphagnous, pastured, boggy area at Method, west of Raleigh, September 24, 1948, *Godfrey and Fox* 48552; Brunswick County: burned-over shrub-bog, in peat and sand, just off of N. C. Rt. 130 on Caswell Beach road, August 20, 1948, *Godfrey* 48425.

Gale (1944) refers to this plant as "common along the coastal plain from New Jersey to southeastern Virginia; apparently more scattered in the Carolinas and Georgia . . . ," and she cites four North Carolina collections, three from the coastal plain and one from the Appalachian Plateau.

RHYNCHOSPORA MICROCARPA Baldw. ex Gray. HYDE COUNTY: upper marsh, Lake Mattamuskeet, August 31, 1948, *R. R. Rudolph* 14–84.

According to Gale (1944), the only collection from north of Georgia was one of Curtis' from Wilmington, N. C., cited by Gray in the type description.

RHYNCHOSPORA MIXTA Britton. PAMLICO COUNTY: large clumps in deep woods' mold in a small branch-bay, near Neuse River below Minnesot Beach, July 26, 1948, *Godfrey* 48279.

Gale (1944) cites but three North Carolina collections, one each from Pasquotank, Beaufort, and Brunswick Counties. In North Carolina the species reaches its northern known limit.

RHYNCHOSPORA PERPLEXA Britton. HYDE COUNTY: upper marsh, Lake Mattamuskeet, June 24, 1948, *R. R. Rudolph* 2–84; COLUMBUS COUNTY: small clumps in a swamp-clearing, northwest side of Waccamaw River, along N. C. Rt. 130, September 4, 1948, *Godfrey* 48492.

Though this species is known on the coastal plain from Virginia southward to Florida and to eastern Texas, Gale (1944) had but one North Carolina specimen, this from Columbus County.

LILIUM CATESBAEI Walt., var. LONGII Fern. WAKE COUNTY: Method Bog (a pastured, sphagnous, boggy swale) near SAL R. R., just west of Raleigh, August 16, 1948, *Fox* 1826 (in flower); same locality, September 24, 1948, *Godfrey and Fox* 48548 (in fruit).

This variety has been reported for several counties in the coastal plain (RHODORA **42:** 443, 1940), but this locality extends it inland considerably, definitely into the piedmont. Four other plants are listed in this paper from the above locality, the ranges of which, according to the literature, are restricted to the coastal plain. They are *Rhexia ciliosa* Michx., *Sabatia gentianoides* Ell., *Eupatorium cordigerum* Fern., and the next.

Aletris aurea Walt. Wake County: Bog (near Method), Raleigh, June 12, 1938, *Godfrey* 4609; near base of slope, border of old field and cane-brake, n. of Meredith College, Raleigh, June 28, 1948, *Fox* 1757.

Small (1933) limits the range of this species to the coastal plain, and Blomquist and Oosting (1948) do not include it as a part of the piedmont flora.

Quercus bicolor Willd. Guilford County: low ground, on South Buffalo Creek, on U. S. Rt. 70, about 3 miles e. of Greensboro, October 1, 1948, *Fox and Godfrey* 1995.

This oak, apparently infrequent in the piedmont section of the state, has been reported from Person, Granville, and Davie Counties (Coker and Totten, 1945). *Q. prinus* L., infrequently seen this far from the coastal plain, was also collected at this locality.

Q. lyrata Walt. Davidson County: creek-bank, 1½ mi. e. of High Rock, July 26, 1947, *Fox* 644.

Common in the coastal plain, this oak has been reported as far inland as Anson County (Coker and Totten, 1945). This collection represents a considerable extension into the piedmont.

Q. phellos L., forma intonsa Fernald (Rhodora **44:** 392, 1942). Northampton County: several large trees, Roanoke River valley, n. of U. S. Rt. 258 bridge, May 22, 1948, *Fox and Godfrey* 1605; Hertford County: mixed forest, compartment 31, Bigwoods Experimental Forest, e. of Como, August 11, 1948, *Woods and Moreland* BWO41A; wooded, swampy area, on U. S. Rt. 258, ¾ mi. s. w. of Como, October 24, 1948, *Fox, Boyce, and Moreland* 2107; Granville County: flood-plains, Little River region, July 10, 1942, *K. Ashley* 429 (in herb. Duke).

This striking variant of the usually glabrous-leaved *Q. phellos*, reported for two southeastern Virginia counties, is described as having the leaves uniformly and permanently tomentulose beneath. At the Northampton County location cited, there are several large trees of this form, some over 2 feet in diameter. Most of the individuals of this species in the immediate locality seemed to be of this pubescent-leaved form. This colony was revisited on October 24, and an examination of the leaves showed them to be essentially as pubescent as they were when seen in

May, thus leaving no doubt as to the permanence of the pubescence.

QUERCUS PUMILA Walt. PENDER COUNTY: in dense clumps scattered in long-leaf pine savanna, near U. S. Rt. 421, 1 mi. s. e. of county line, October 29, 1948, *Fox and Godfrey* 2138; COLUMBUS COUNTY: savanna, 0.7 mi. n. of Wananish R. R. station, August 28, 1948, *Fox and Whitford* 1874; BLADEN COUNTY: savanna, n. of N. C. Rt. 211, 2.1 mi. n. e. of Columbus County line, August 28, 1948, *Fox and Whitford* 1866.

The range of this species is given by Small (1933) as extending into North Carolina, but its representation in the principal N. C. herbaria indicates that it has been little collected here. Two additional collections are known to us, from Columbus and Bladen Counties, both in the herbarium of the University of North Carolina.

Q. VIRGINIANA Mill., forma MACROPHYLLA (Sargent) Trelease. BRUNSWICK COUNTY: wooded bank of Cape Fear R., about one mile above Southport, July 11, 1947, *Fox and Wells* 471.

A single tree, about 20 feet tall and with trunk 3 inches in diameter near the base, growing on a low, sandy ridge with typical *Q. virginiana* nearby, seems to belong to this form. Though originally known only from Atascosa County, Texas, trees have been reported from Princess Anne County, Virginia, by Fernald (RHODORA **43:** 550, 1941). Leaves of our tree have somewhat larger dimensions than those given in the original description, twelve of the larger leaves from a small series of specimens collected averaging 11.9 cm. long and 4.9 cm. wide. The largest leaf found is 18 cm. long and 7.7 cm. wide. The twigs, petioles, undersurface of leaves, etc., are densely pale-tomentose.

QUERCUS VIRGINIANA Mill., var. GEMINATA (Small) Sarg. CARTERET COUNTY: in white, coarse sand, w. end of Harker's Island, September 12, 1947, *Fox, Whitford, and Scofield* 1179.

We have seen several specimens of this variety from Brunswick and New Hanover Counties, but we know of no collections recorded from north of the Wilmington area.

PLANERA AQUATICA Gmel. COLUMBUS-BRUNSWICK COUNTY: common on Waccamaw R. banks, just above N. C. Rt. 130 bridge, July 14, 1947, *Fox and Wells* 507.

The range of this plant is reported as extending into this state by various authors, but in the larger herbaria in the state there are no specimens representing collections in North Carolina. Therefore, it seems worthwhile to list this one and to record the fact that for several miles along both sides of the Waccamaw R. above the bridge mentioned, it is one of the common stream-margin trees.

Froelichia floridana (Nutt.) Moq. Pamlico County: abundant in sandy old field at Minnesot Beach, July 2, 1948, *Godfrey* 48297; old sandy field, July 10, 1933, *Oosting* 33220 (in herb. Duke); Hoke County: along highway near Morse Cr. (?), July 20, 1937, *C. L. Neuman;* New Hanover County: on causeway, sandy soil, August 24, 1931, *Blomquist* 3577 (in herb. Duke).

Not heretofore recorded for North Carolina, the range of this plant is given by Small (1933) as "Coastal Plain, Fla. to Miss. and Ga., adv. in Del." Smith (Journ. Elisha Mitch. Sci. Soc. **62:** 81, 1946) has reported it for Darlington County, South Carolina.

Ranunculus septentrionalis Poir. Wake County: swampy peninsula on the Neuse River at Falls of the Neuse, April 8, 1937, *Godfrey:* alluvium in depressions back of natural levee along Neuse River, east of Raleigh, April 11, 1948, *Godfrey* 48010; Chatham County: flood-plain of New Hope Creek, beech woods, along U. S. Rt. 64, east of Pittsboro, April 25, 1948, *Godfrey, Fox, & Campana* 48058.

Blomquist and Oosting (1948) do not include this species although they do include *Ranunculus hispidus* Michx. The populations which our specimens represent are of plants which have a definite procumbent habit, only a sparse pubescence, and fruits which have conspicuously wide margins. This is in contrast to the erect habit, usually dense pubescence, and narrowly margined fruits of *R. hispidus.*

Magnolia acuminata L. Stokes County: creek-bank, near N. C. Rt. 89, just e. of Danbury, August 19, 1947, *Fox* 840.

We include this collection because we believe the station to be farther from the mountains than any other authentic report for this species.

M. cordata Michx. (*M. acuminata,* var. *cordata* Sarg.). Randolph County: on rocky slope near Rt. 13, about ½ mi. n.

of Park's Crossroads, July 27, 1947, *Fox* 659; rocky bluff, 1.3 mi. n. of Park's Crossroads, Apr. 25, 1948, *Fox, Godfrey, & Campana* 1353; STANLY COUNTY: upland woods, near road to lower dam, 1½ mi. e. of Badin, May 7, 1948, *Fox, Godfrey & Boyce* 1405.

This little-understood *Magnolia*, the status of which has recently been discussed by Coker (Jour. Elisha Mitchell Sci. Soc. **59:** 81–88, 1943) and Duncan (Castanea **13:** 75–77, 1948), has been previously known from two counties in North Carolina; *viz.*, Anson and Moore. These collections extend its range somewhat northward in the Yadkin River drainage. Since size has been considered of significance in distinguishing this species (or variety) from the Appalachian and more northern *M. acuminata* (and its var. *aurea* Ashe), it is probably worthwhile to note that the second Randolph Co. collection, *Fox, et al.* 1353, was from a tree 45–50 feet tall and, at breast height, 17 inches in diameter.

M. MACROPHYLLA Michx. WAKE COUNTY: lake-shore, Lake Johnson, July 13, 1938, *Godfrey* 5016.*

Coker and Totten (1945) referred to this collection, indicating that it extended the species far out of its presently known range, and adding further, "We assume that this was wild but there is no note on the label to this effect." We take this opportunity to resolve any feeling of doubt about its "wildness." The station at Lake Johnson is at about the summit of a north-facing bluff on the lake in an area of second growth hardwood forest. It was revisited by the authors within the past year, when the specimen, which consists of several vigorous shoots from an old tree-base, was relocated. We also found a small seedling a few hundred yards away on an east-facing slope.

MAGNOLIA TRIPETALA L. CRAVEN COUNTY: mesic woods, on Neuse River near Flanner's Beach (about 10 miles s. e. of Newbern), Aug. 30, 1947, *Fox & Whitford* 1113; PAMLICO COUNTY: woodland, near Neuse R., below Minnesot Beach, July 24, 1948, *Godfrey* 48345.

* The few Godfrey collections of 1938 cited in this paper are from a large series of North Carolina specimens assembled by the co-author in the summer of 1938 for the Arnold Arboretum and the Gray Herbarium of Harvard University. No report was ever published exclusively based upon those collections, but in the ensuing years reference has been made to a great many of them in monographic treatments, and in papers of a phytogeographic nature.

Though fairly common in the piedmont, this species is apparently infrequent in the lower coastal plain. These locations are closer to the coast than any others that have been reported except for Curtis' inclusion in his list for the Wilmington area (1834) and later listing (as *M. umbrella* Lam.) for that area by Wood and McCarthy (1886). Croom and Loomis (1833) include it in their New Bern catalogue. The Pamlico County location is only about 12–15 miles from the main body of Pamlico Sound. There is a specimen in the herbarium of Duke University collected in Perquimans County in 1932 by M. Glasson, but the exact locality is not given.

Lathyrus palustris L., var. genuinus Gren. & Godr. Washington County: climbing on vegetation, wet woodland, near pumping station on Roanoke River, above paper mill at Plymouth, May 21, 1948, *Fox & Godfrey* 1538.

Only one of the varieties of this widespread species, as delineated by Fernald (in Rhodora **13**: 47–52, 1911), is given as ranging as far south as North Carolina; *viz., L. palustris* L., var. *myrtifolius* (Muhl.) Gray (*L. myrtifolius* Muhl. of Small's manual). Even this variety is admitted by Small to the "Coastal Plain only N." Curtis (1834) lists *L. palustris* for the Wilmington area but in his later publication (1867) lists *L. myrtifolius* Muhl. for "Low. Dist." Croom (1837) lists *L. palustris* for New Bern and vicinity. Wood and McCarthy (1886) list "*L. paluster,* Linn., var. *myrtifolium,* Gray." Our plants are very likely adventitious, since they are in an area that seems to have been very much disturbed in recent years, due to paper-mill operations. However, they are well-established and apparently thriving. Typical *L. palustris* (or var. *genuinus*) occurs as far south in the east as northern Pennsylvania, according to a map published by Fassett (1939), presumably based on a study of specimens in several of the major herbaria.

Polygala Hookeri T. & G. Carteret County: savanna at Newport, Aug. 6, 1938, *Godfrey* 5784; Onslow County: moist soil, waste ground, Verona, July 21, 1922, *Randolph and Randolph* 940 (distributed as *P. brevifolia*); savanna, 5 miles east of Jacksonville, Aug. 6, 1938, *Godfrey* 5817; savanna, 12 miles north of Jacksonville, Aug. 6, 1938, *Godfrey* 5732; Hoff. Forest, Deppe, Aug. 17, 1944, *R. W. Collins:* grass-sedge savanna, 2.5

miles south of Maysville, along U. S. Rt. 17, July 3, 1948, *Godfrey* 48301; PENDER COUNTY: "Big Savanna," July 2, 1924, *B. W. Wells:* NEW HANOVER COUNTY: open woods, wet sandy soil, July 18, 1927, *W. H. Munter:* COLUMBUS COUNTY: savanna near Old Dock, Aug. 29, 1938, *Godfrey* 6330; BRUNSWICK COUNTY: wire-grass (*Aristida stricta*) savanna, Orton Plantation, 10 miles north of Southport, Aug. 21, 1941, *Godfrey and Hodge* (*Plantae Exsiccatae Grayanae,* No. 1153).

All of the citations given here are from the Gray Herbarium* except Wells' from Pender County and Godfrey's No. 48301. These are in the N. C. State College Herbarium.

The range of the species is here extended northward from the coastal plain of western Florida. We can record it here also for South Carolina; grass-sedge bog or savanna, 12 miles north of Georgetown, Georgetown County, June 23–24, 1939, *Godfrey* and *Tryon* 49 (in herb. Gray).

ACER SACCHARINUM L. MARTIN COUNTY: common, bank of Roanoke River, e. of Hamilton, May 21, 1948, *Fox & Godfrey* 1502. EDGECOMBE COUNTY: bank of Tar R. about 5 mi. above bridge north of Heartsease, June 17, 1948, *Fox & Whitford* 1742.

Coker and Totten (1945) regard this maple as "rare and local" in the piedmont and coastal plain of North Carolina. They report it for Northampton Co., farther up the Roanoke River. It is very plentiful along this river near Hamilton, but the Edgecombe County collection was from the only tree of this species observed on an estimated thirty-mile canoe trip on a portion of the Tar River between Rocky Mount and Tarboro. Croom (1837) lists this species (as *A. dasycarpum* Ehrh.), but his catalogue included both native and naturalized plants, with no distinction made.

HIBISCUS PALUSTRIS L. (sensu Fernald in RHODORA **44:** 269, 1942). MOORE COUNTY: swamp of Little River, on U. S. Rt. 1, ½ mi. n. of Lakeview, July 25, 1947, *Fox* 585; WAKE COUNTY: swampy, low, moist soil along highway, Varina-Angier, July 15, 1935, *Correll & Blomquist* 2515 (in herb. Duke).

Fernald gives the range of this species, as he defines it, as extending southward to eastern Virginia.

* Prof. Fernald very kindly examined the material of *P. Hookeri, Rhexia ciliosa,* and *Sabatia gentianoides* in the Gray Herbarium and furnished us with the citations of specimens deposited there.

Stewartia Malachodendron L. Hertford County: mixed pine-hardwood forest, 2 mi. w. of Camp P-D, near Bigwoods Experimental Forest, August 26, 1948, *F. W. Woods & D. E. Moreland.*

This species, apparently local in its occurrence, has been reported from nearby counties in N. C. and Va. This collection is cited because, according to the collectors, the forest undergrowth over an area of several acres is dominated by this shrub.

Rhexia ciliosa Michx. Wake County: Sphagnous bog at Method, July 13, 1938, *Godfrey* 4984 (in herb. Gray); "Method Bog," near SAL R. R., just w. of Raleigh, Aug. 18, 1948, *Fox* 1829.

Though listed by Curtis (1867) for the "Low. and Mid. Districts," this species, frequently flowering in July, is not included by Blomquist and Oosting (1948). Small (1933) restricts its range to the coastal plain. The above collections, both from the same locality, are the only ones from the Piedmont region of which we are aware.

Oxypolis ternata (Walt.) Heller. Pender County: savanna, about 1 mile n. of Burgaw, October 19, 1940, *Radford* 705 (in herb. U. N. C.); grass-sedge savanna, along U. S. Rt. 421, south of Harrell's Store, 1 mile from the Sampson County line, October 29, 1948, *Godfrey & Fox* 48719; Brunswick County: grass-sedge bog in depression in pine-barren, The Oaks Plantation, October 4, 1941, *Godfrey* 10107 (in herb. U. N. C.); grass-sedge savanna, along road to Caswell Beach, very near its junction with N. C. Rt. 130, October 22, 1948, *Godfrey* 48690.

These collections are enumerated in view of Fernald's statement (Rhodora **41:** 552, 1939) that there were at that time (when he was reporting the plant for tidewater Va.) only two North Carolina specimens in the Gray Herbarium and the New York Botanic Garden Herbarium, few others except from Apalachicola, Florida. At the two localities in which we made our 1948 collections, although the filiform plants were difficult to see in the dominantly grassy vegetation, numerous plants were to be found scattered over the areas. Many were in excellent fruiting condition, too, which was in contrast to the experience of the Virginia collectors, who found no mature fruiting specimens, a fact which prompted Fernald to suggest the absence of "the right insect to insure pollination."

Gaultheria procumbens L. Onslow County: cleared area, ¼ mi. w. of Camp Cowhorn, Hofmann Forest, May 26, 1948, *Steve G. Boyce* 677; Jones County: roadside, road to experimental pastures, April 29, 1948, *Boyce & Woods* 563.

Apparently quite infrequent in the outer piedmont and coastal plain of N. C., the range of this plant is given by Small (1933) as "in coastal plain only northward." Yet it appears in Croom and Loomis' New Bern catalogue (1833) and was reported for Wilmington by Wood and McCarthy (1886).

Lysimachia nummularia L. Northampton County: cart-road, low ground, Roanoke R. Valley, just above U. S. Rt. 258, May 22, 1948, *Fox & Godfrey* 1609; Wake County: low ground near pond, Crabtree Creek Park, May 15, 1948, *Fox & Whitford* 1437.

This naturalized plant is well established at these localities, both isolated from any present habitations. It is either very uncommon or has escaped notice in the coastal plain and outer piedmont of this state, since there are no specimens from these regions in the local herbaria. Davidson, Haywood and Macon Counties are the only N. C. counties represented. The earliest report of this species for N. C. seems to be that of M. E. Hyams (Jour. Elisha Mitchell Sci. Soc. **2:** 74, 1885).

Bumelia lycioides (L.) Pers. Bladen County: wooded river bank, on Cape Fear River, below ferry n. e. of Carvers, August 28, 1948, *Fox & Whitford* 1860; Craven County: sandy bank of Neuse River, near mouth of Batchelder Creek, 1½ mi. n. of New Bern, August 31, 1947, *Fox & Whitford* 1126; Carteret County: sand, near Bogue Sound, Camp Glenn, s. of Morehead City, August 30, 1947, *Fox & Whitford* 1107; maritime woods, Shackelford Banks, point opposite Beaufort, September 11, 1947, *Fox, Whitford, & Scofield* 1146; Dare County: sand, behind low dunes, w. of freshwater pond, Nag's Head, June 29, 1947, *Fox & Whitford* 380.

This small tree, judging from collections cited by Clark (A revision of the genus *Bumelia* in the United States, Ann. Mo. Bot. Gard. **29:** 1942) and localities mentioned by Coker and Totten (1945), has previously been collected in the coastal plain of N. C. only in the vicinity of Wilmington in the southeastern corner of the state and on Church's Island in the northeasternmost county in the state. However, it is, strangely enough,

known from the piedmont counties, Lincoln, Stanly, and Rowan. Croom and Loomis (1833) list it for New Bern (Craven County). Clark states that it is widespread but infrequently collected; Coker and Totten state that it is "local" and "rarely seen." After considerable collecting in the coastal plain, we are inclined to the view that it occurs frequently all along the N. C. coast but is quite rare in the inner coastal plain.

Sabatia gentianoides Ell. Wake County: "Method Bog," SAL R. R., just w. of Raleigh, August 18, 1948, *Fox* 1828; Johnston County: pine-barren, s. of Selma, July 28, 1933, *E. V. Deans, Jr.* (in Herb. U. N. C.); Bladen County: savanna on N. C. Rt. 211, 2.1 mi. n. e. of Columbus County line, Aug. 28, 1948, *Fox & Whitford* 1867; Pender County: savanna, Burgaw, Aug. 7, 1938, *Godfrey* 5924 (in herb. Gray); margin, "Big Savanna," July 24, 1925, *B. W. Wells:* Holly Shelter, margin of swamps, Aug. 5, 1884, *W. W. Ashe* (in herb. U. N. C.); Duplin County: savanna, 8 mi. w. of Richlands, Aug. 6, 1938, *Godfrey* 5874 (in herb. Gray); Carteret County: savanna at Newport, Aug. 6, 1938, *Godfrey* 5789 (in herb. Gray); moist, sandy soil, waste ground, Bettie, July 17, 1922, *L. F. & Fannie R. Randolph* 804 (with note, "Extends range from Georgia"—in herb. Gray); counties not given on labels: near Wilmington, Aug. 23, 1931, *Mrs. Wells* (in herb. U. N. C.); near Folkstone, July 25, 1933, *E. J. Alexander* (in herb. U. N. C.); habitat in Oriente Carolina Septentrionalis, August, 1885, *McCarthy* (as *S. chloroides* Pursh, in herb. U. N. C., duplicate also in herb. Gray); low meadow, near Jackson, Aug. 1935, *William Rhoades* (in herb. Gray).

Though this species is listed for the Wilmington area by Curtis (1834) and by Wood and McCarthy (1886) and for "Low. Dist." by Curtis (1867), Small gives the range (as *Lapithea gentianoides* (Ell.) Griseb.) as "coastal plain, Fla. to Tex. and Ga." This plant has been confused by most local students with *S. dodecandra* (L.) BSP. (*S. chloroides* Pursh), probably because both have the calyx and corolla 7–12 parted and have linear-lanceolate leaves. However, according to manuals, *S. gentianoides* has sessile or subsessile flowers in a congested cyme and the anthers are not coiled, characters which have led Small to retain it in a separate genus, whereas *S. dodecandra* has pedicelled flowers in panicles and has coiled anthers. Fernald (Rhodora **44:** 1942) states that *S. dodecandra* is a plant of brackish, tidal shores; while *S. gentianoides*, where we have seen it, is a plant of savannas, small bogs, or pinelands. The speci-

mens listed are considered as representative and do not include all N. C. specimens of *S. gentianoides* that we have examined. Considering the early references to this plant for the Wilmington area and the older collections of Ashe, McCarthy and the Randolphs listed above, we are at a loss to understand why Small (1933) failed to extend the range into North Carolina.

Leonotis nepetaefolia R. Br. Wake County: low, moist area in pasture near small creek on N. C. Rt. 55, 3 mi. n. w. of Fuquay Springs, October 12, 1948, *Fox & Godfrey* 2074.

This exotic mint, previously unrecorded for North Carolina, is apparently well established at this location. In the herbarium of the University of North Carolina are specimens from Darlington and Chesterfield Counties, South Carolina, the nearest locations to the Wake Co. station of which we are aware.

Macbridea pulchra Ell. Sampson County: wet flat near creek, Mingo Swamp, on U. S. Rt. 421, August 29, 1948, *Fox & Whitford* 1911; Columbus County: lowlands, near Whiteville, August 16, 1927, *P. O. Schallert* 9398 (in herb. Duke).

Small (1933) gives the range of this mint as extending as far north as North Carolina. Croom and Loomis (1833) report it for Lenoir Co., and Curtis (1834) lists it for the Wilmington area. Wood and McCarthy (1886) describe it as "rare" and mention one locality near Wilmington. The two collections cited above are the only ones for this species found in the three state herbaria examined.

Sphenoclea zeylanica Gaertn. Hyde County: mud-flat, exposed only during summer months, Lake Mattamuskeet, September 9, 1948, *R. R. Rudolph* 1–110.

According to Small (1933), this is a naturalized species in the coastal plain, La. to Ark.; it may have become established here from seed brought in with those of other plants sown for wild fowl food.

Eupatorium anomalum Nash. Pamlico County: old field, coarse sand, sandy ridge, 2 miles southwest of Arapahoe, July 28, 1948, *Godfrey* 48337.

An additional North Carolina station for a plant, the range of which Fernald (Rhodora **44:** 460, 1942) extended northward from Florida to New Hanover Co. in southeastern North Carolina

when he identified and cited an hitherto undetermined Godfrey specimen from there.

Eupatorium cordigerum Fern. Hertford County: upland woods, Camp Co. Forest 2 miles northeast of Como, October 24, 1948, *Fox, Boyce & Moreland* 2113; Bertie County: low ground, near cane-depression, on N. C. Rt. 308, 7 miles northwest of Windsor, May 22, 1948 (not flowering), *Fox & Godfrey* 1590; Martin County: swampy pasture on U. S. Rt. 64, 3 miles east of Robersonville, October 24, 1948, *Fox, Boyce, & Moreland* 2135; Pamlico County: abundant in a shrub-bog, northeast side of Neuse River, east of Arapahoe, July 26, 1948, *Godfrey* 48346; Wake County: abundant in pastured boggy swale at Method, just west of Raleigh, September 24, 1948, *Godfrey & Fox* 48541; clearing along roadside at edge of a branch-bay, just southeast of Willow Springs, October 15, 1948, *Godfrey & Fox* 48660.

Fernald (Rhodora **45:** 477, 1943) described this as a variety of *E. rotundifolium* L., and in addition to his Virginia material, placed a Godfrey collection from northeastern North Carolina here. Later, Fernald (Rhodora **47:** 192, 1945) raised it to specific status and stated that it was characteristic of river-marshes, swales, and bogs of the coastal plain of southeastern Virginia and North Carolina. Our collections contribute to a fuller knowledge of its distribution in North Carolina. The Method station in Wake County is on the outer piedmont.

Eupatorium cuneifolium Willd. Brunswick County: abundant in coarse sand, bulldozed clearing in scrub-oak areas back of the beach, Long Beach, August 23, 1948, *Godfrey* 48439.

For this species there is but one record of occurrence north of South Carolina. Fernald (Rhodora **37:** 446, 1935) reports it for southeastern Virginia. The plants at our Long Beach station were numerous over a rather extensive dry, sandy area, and were uniformly much branched at the base. Many of them had literally dozens of erect and semi-erect branches.

Eupatorium leptophyllum DC. Brunswick County: sandy peat, middle of margin between pond and pine-barren, Orton Plantation, September 27, 1941, *Godfrey* 10038 (in herb. U. N. C.).

Heretofore unrecorded for North Carolina, its range is given by Small (1933) as "coastal plain, Fla. to Miss. and S. C."

Eupatorium linearifolium Walt. (*E. tortifolium* Chapm.). Brunswick County: coarse sand, plowed fire-lane across long-

leaf pine, turkey-oak sand-ridge, Orton Plantation, 10 miles north of Southport, August 19, 1948, *Godfrey* 48385; CUMBERLAND COUNTY: sandhills, near U. S. Rt. 301, 8 miles south of Fayetteville, August 27, 1947, *Fox* 1031; HARNETT COUNTY: pineland near Lillington, Aug. 5, 1938, *Godfrey* 5639 (in herb. Gray); WAKE COUNTY: sandy ridge, very near Wake-Harnett County line on road between Fuquay Springs and Duncan, October 16, 1948, *Godfrey & Fox* 48667; SAMPSON COUNTY: pineland near Roseboro, August 5, 1938, *Godfrey* 5722 (in herb. Gray).

Fernald (RHODORA **42:** 481, 1940) extended the range of *E. tortifolium* from South Carolina to Virginia, but there are no published records of its occurrence in North Carolina.

EUPATORIUM RECURVANS Small. MARTIN COUNTY: swale near Williamston, Oct. 15, 1938, *Godfrey* 7022 (in herb. Gray); DARE COUNTY: 10.3 miles north of Dare County line, roadside, unimproved No. 264, September 20, 1940, *Radford & Stewart* 808 (in herb. U. N. C.); CRAVEN COUNTY: roadside near Ft. Barnwell, October 13, 1938, *Godfrey & White* 6842 (in herb. Gray); PAMLICO COUNTY: old field, coarse sand, sand-ridge, 2 miles southwest of Arapahoe, July 28, 1948, *Godfrey* 48356; CARTERET COUNTY: pineland at Sea Level, September 1, 1938, *Godfrey* 6404 (in herb. Gray); BLADEN COUNTY: near White lake, October 6, 1933, *Oosting & Blomquist* 33637 (in herb. Duke); BRUNSWICK COUNTY: swale, Caswell Beach, November 15, 1947, *Godfrey* 12074.

Fernald (RHODORA **44:** 461, 1942) extended the range of this species to Southeastern Virginia from Georgia and Southeastern South Carolina. The records here given close the gap to some extent. Our field observations during the past summer indicate that this is one of the more ubiquitous of the Eupatoria on the outer coastal plain of southeastern N. C.

LIATRIS GRAMINIFOLIA (Walt.) Willd., var. SMALLII (Britton) Fern. and Grisc. STOKES COUNTY: scattered plants in chestnut-oak woods, around the parking area, Hanging Rock State Park, October 2, 1948, *Godfrey & Fox* 48575.

Gaiser (RHODORA **48:** 253, 1946) cites three North Carolina collections, all from the higher mountains. Ours is from a low, outlying mountain range considerably east of the Blue Ridge.

CHRYSOPSIS ADENOLEPIS Fern. CUMBERLAND COUNTY: sandy turkey-oak community, 2 miles southwest of Fort Bragg, October 2, 1937, *Oosting* 1611 (in herb. Duke); WAKE COUNTY: sandy ridge, very near the Wake-Harnett County line on the road be-

tween Fuquay Springs and Duncan, October 16, 1948, *Godfrey & Fox* 48668; abundant in railroad ballast and adjacent sterile gravelly-clay soil along the right-of-way at McCullers, September 17, 1948, *Godfrey* 48533.

Fernald (Rhodora **44:** 471, 1942) described this species from specimens from Moore County; he ascribed only two collections, both from there, to it. Those listed here are the first to be reported subsequent to that time.

Chrysopsis Correllii Fern. Pender County: plowed savanna, 1 mile from Sampson County line, south of Harrell's Store on U. S. Rt. 421, October 29, 1948, *Godfrey & Fox* 48712; Brunswick County: coarse sand in an open pine-barren, Orton Plantation, September 27, 1941, *Godfrey* 10033 (in herb. U.N.C.); coarse sand, bulldozed areas in scrub-oak barrens, behind beach, Long Beach, August 23, 1948, *Godfrey* 48447.

Following his description of this plant, Fernald (Rhodora **44:** 470, 1942) cites but four collections, two from Bladen County and one from Scotland County, N. C., and one from Colleton County, S. C. In his description, Prof. Fernald used the phrase "*Perennis subcespitosa.*" Interestingly, we noted in the field, both at the Long Beach and Pender County stations, that the abundant plants were characteristically in very large, tight tufts, sufficiently large in the one case, at least, for twenty ample specimens to be made from an average-sized clump.

Chrysopsis pinifolia Ell. Harnett County: sandridge, bordering pocosin, on U. S. Rt. 15A, 1 mile south of Bunn Level, August 28, 1948, *Fox & Whitford* 1839.

Small (1933) indicates that this plant is known only from the sandhills in Taylor County, Georgia. Dr. Wilbur Duncan kindly checked in the Gray Herbarium, the U. S. National Herbarium, and the New York Botanic Garden, and informs us that there is no material at those places from anywhere except Taylor County, Georgia. Also he checked a duplicate of our collection and concurs in our determination.

Anaphalis margaritacea (L.) B. & H. Pamlico County: abundant in sandy old fields at Arapahoe, July 13, 1948, *Godfrey* 48322; Onslow County: very abundant in an old field, 2 miles south of Jacksonville on U. S. Rt. 17, June 21, 1948, *Godfrey* 48201; Jones County: wet sandy soil at Trenton, July 11, 1938, *Robert Gray* (in herb. Duke).

Small (1933) gives the range of this species as "North Carolina to Alaska, Ontario, and Newfoundland, in the coastal plain only N." The collections here cited are from the outer coastal plain. Allard (Claytonia **3:** 12, 1936) records it for Augusta County, Va., in the Alleghenies at 4,400 ft. (only one small specimen), and states that there were no specimens in the U. S. National Herbarium from south of Pennsylvania. McAtee (Journ. Elisha Mitch. Sci. Soc. **35:** 74, 1919), however, had reported it in a list of plants for Church's Island in Currituck County, N. C., the most northeastern county of the state.

Helenium floridanum Fern. Onslow County: abundant in grass-weed border along roadside from Jacksonville to Verona along U. S. Rt. 17, June 21, 1948, *Godfrey* 48203.

An extension of range northward of a plant which Fernald (Rhodora **45:** 494, 1943) described, largely on the basis of the pappus-pales, as being distinct from *Helenium nudiflorum* Nutt., and which, on the basis of specimens then available, he found to be localized in northern Florida. A characteristic of our specimens, noted in the field, but not so apparent in the dried condition, was their clammy quality. A collection of *H. nudiflorum*, with pappus-pales of the typical wide-ranging plant, was made in Craven County a few days earlier (roadside grass-weed border and in shallow roadside ditch, 3 miles northwest of New Bern on U. S. Rt. 70, June 8, 1948, *Godfrey* 48149). Those specimens were much less puberulent throughout and lacked the clammy quality entirely. In their superficial aspects the plants from the two places appear much alike.

Madia sativa Molina. Rockingham County: on farm of W. D. Brown, about ten miles east of Reidsville, May, 1948, *I. Van Sharpe*.

This collection was sent to our department for identification, and it represents an additional station for a western weed reported but once before for the state. Alexander (Castanea **5:** 92, 1940) first reported it from Macon County, N. C. There is also a specimen in the Duke University Herbarium from Durham County, and Blomquist and Oosting (1948) include it in the piedmont flora, presumably on the basis of that specimen.

Crepis pulchra L. Nash County: ballast, ACL railroad, north of Tar River, Rocky Mount, May 22, 1948, *Fox & Godfrey*

1641; Wake County: railroad ballast, SAL R. R., N. C. State College campus, Raleigh, May 26, 1948, *Godfrey* 48097; Cabarrus County: roadside grass-weed border, just west of Cabarrus-Stanly County line, on N. C. Rt. 73, May 9, 1948, *Godfrey, Fox, & Boyce* 48084.

This species is new to the Small's Manual range; it was abundant in the three localities from which the above cited specimens were taken. Freeman (Castanea **6:** 78, 1941), reporting it for Rockbridge County, Virginia, makes the comment, "This European species appears to be becoming more abundant and more widely distributed in Virginia."

Literature Cited

Blomquist, H. L. and H. G. Oosting. 1948. A Guide to the Spring and Early Summer Flora of the Piedmont, North Carolina. Fourth Rev. Edition.

Coker, W. C., and H. R. Totten. 1945. Trees of the Southeastern States, 3rd. Edition. University of North Carolina Press, Chapel Hill, North Carolina.

Croom, H. B. 1837. A Catalogue of Plants, Native and Naturalized, in the Vicinity of New Bern, North Carolina; with Remarks and Synonyms. G. P. Scott and Co., Printers. New York.

———, and H. Loomis. 1833. Catalogue of Plants Observed in the Neighborhood of New Bern, North Carolina. Spectator Office, New Bern.

Curtis, M. A. 1834. A Catalogue of Plants Growing Spontaneously Around Wilmington, North Carolina, with Remarks on New and Obscure Species. Boston Jour. Nat. Hist. **1:** 82–141.

———. 1867. Botany; Containing a Catalogue of the Indigenous and Naturalized Plants of the State. Geol. and Nat. Hist. Surv. of N. C., Part III. Raleigh.

Fassett, N. C. 1939. The Leguminous Plants of Wisconsin. Univ. of Wisc. Press, Madison.

Gale, Shirley. 1944. Rhynchospora, section Eurhynchospora, in Canada, the United States, and the West Indies. Rhodora **46**.

Small, J. K. 1933. Manual of the Southeastern Flora. Published by the Author. New York.

Wood, T., and G. McCarthy. 1886. Wilmington Flora; a List of Plants Growing about Wilmington, N. C., with Date of Flowering, with a Map of New Hanover County. Jour. Elisha Mitchell Sci. Soc. **3:** 77–141.

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PLANTS NEW TO ILLINOIS OR TO THE CHICAGO AREA IN ILLINOIS

Julian A. Steyermark and Floyd A. Swink

A number of additions to the state flora as well as to the Chicago region in Illinois have turned up since the publication of Jones's "Supplementary list of Illinois Vascular Plants" (Am. Midl. Nat. **37:** 785–787. May, 1947). Most of them represent naturalized or introduced species, but one of them, *Stellaria pubera*, has apparently been overlooked throughout the previous period of intensive botanizing in the Chicago area. Specimens of all the collections may be found deposited in the Herbarium of the Chicago Natural History Museum.

Botrychium dissectum Spreng., var. typicum. The following collection, *Steyermark 64261*, woods at Biltmore Estates subdivision, 5 mi. north of Barrington, Lake Co., October 27, 1946, is the nearest thus far recorded for the Chicago area. Recently, another collection of this species has been made by George B. and Barbara Fell in Boone County. Their collections are from sandy loam soil, black oak upland woods, 3 mi. north of Argyle, Boone Co., November 27, 1948, *Geo. B. & B. Fell F 48-444 B.* In Jones' "An Enumeration of Illinois Pteridophyta" (Am. Midl. Nat. **38:** 89. July, 1947), the typical variety of the species is noted only from Gallatin, Kankakee, and Peoria counties.

Echinochloa colonum (L.) Link. This species, new to Illinois and apparently the northernmost locality thus far recorded, was collected by *F. A. Swink* at Harrison Street and Douglas Park elevated tracks, Chicago, Cook Co., August 18, 1947.

Stellaria pubera Michx. The following collection, wooded slopes above limestone canyon of Delaney's Ravine, at 111th Street, ¼ mi. east of Archer Avenue, Sag Bridge, Cook Co., July 3, 1948, *Steyermark & Swink 65855*, was made while the authors were searching for plants of *Jeffersonia diphylla* at this locality. This remarkable discovery adds a species of indigenous plants to the flora of Illinois.

The late Professor Cowles had repeatedly brought his classes in ecology to this ravine, and Dr. Pepoon, E. J. Hill, and the

earlier botanists were also acquainted with the spot. It is, therefore, surprising how the plant could have escaped previous notice. This limestone canyon is spectacular for the Chicago region, being formed of the Niagara limestone. A number of rare and unusual plants occur here. At the base of the bluffs in sheltered places grow *Actaea rubra, Hydrastis canadensis*, and *Hybanthus concolor*, while in the crevices of the limestone bluffs are plants of *Cystopteris bulbifera* and *Pellaea glabella*. Associated with plants of *Jeffersonia diphylla*, on the upper slopes above the limestone bluffs, were a number of clumps of the *Stellaria pubera*. Such a find may indicate that other equally interesting species may in time be added to the flora of the state.

Anemonella thalictroides (L.) Spach, forma Favilliana Bergseng ex Fassett, Trans. Wisc. Acad. Sci. **38:** 199. 1946. This form, in which all the stamens have become petaloid, was originally described from Wisconsin. It is a double-flowered type, varying in color from deep pink to orchid, and is very attractive, reminding one of tiny heads of zinnias, roses, and the like. It was collected, for the first time in Illinois, by *Cora Steyermark*, in upland oak-hickory woods, Biltmore Estates subdivision, 5 mi. north of Barrington, Lake Co., April, 1944.

Erucastrum gallicum (Willd.) O. E. Schulz. This species is new to the Illinois flora. It has been collected from three localities, as follows: *Swink*, along Chicago & Northwestern railroad tracks north of city limits of Waukegan, Lake Co., June 15, 1946; along Chicago, Burlington, & Quincy railroad tracks just east of Harlem Avenue, Berwyn, Cook Co., June 22, 1946, *Swink;* and along railroad tracks just north of Fernwood Station, near 102nd Street, west of State Street, Chicago, Cook Co., September 29, 1940, *Steyermark 28250*.

Glycyrrhiza lepidota (Nutt.) Pursh. Not previously reported for Illinois, although there is a specimen from Cahokia, St. Clair Co., collected by *H. Eggert* in the Herbarium of the Chicago Natural History Museum. Another collection, in the vicinity of the Chicago area, has been made recently by *Swink*, along Illinois Central railroad tracks just north of St. Charles Road, Elmhurst, Du Page Co., July 6, 1948.

Hybanthus concolor (Forster) Spreng. Although reported by Pepoon from Indiana in the woods of Chesterton (Porter Co.)

and eastward in Illinois, it has not been previously recorded from the Chicago area. Apparently it has been overlooked all these years, however, since it was found associated with the other rarities in Delaney's Ravine during 1948. The collection is from middle and upper slopes of Delaney's Ravine, at 111th Street, ½ mi. east of Archer Avenue, Sag Bridge, Cook Co., July 3, 1948, *Steyermark & Swink 65853.*

Epilobium hirsutum L. This attractive species with showy pink petals is naturalized in but a few places in the United States. It has not been previously reported from Illinois. It was collected near base of railway embankment of Nickel Plate Railroad, between Torrence Avenue and Lake Calumet at about 11900 South, Chicago, Cook Co., August 15, 1948, *Steyermark & Swink 65978.*

In the locality above cited, the plants were bordering a ditch at the base of the railroad embankment and were growing at the edge of the water. According to Dr. José Cuatrecasas, this is similar to its habitat in Spain, where it frequently inhabits borders of irrigation ditches.

Leucospora multifida (Michx.) Nutt. This species is new to the flora of the Chicago area in Illinois. It was collected by *Swink*, Burnham, Cook Co., September 28, 1946.

Veronica Chamaedrys L. Previously unreported from Illinois, this species has been collected recently in the Chicago area: Elm Street, one mile south of Hinsdale, between 60th and 62nd Streets, Du Page Co., May 20, 1948, *Bros. Edward Aksomaitis & Peter Cibulskis.*

Chicago Natural History Museum.

Populus: a Correction.—In Rhodora, l. 234 (1948), I proposed the name *Populus balsamifera* L. var. *Fernaldiana* Rouleau, based upon *P. balsamifera* var. *Michauxii* sensu Henry. I was unaware that a new name had already been published. Dr. Nils Hylander of the University of Uppsala has called my attention to the fact that he had already published a new name for this variety, i. e. *P. balsamifera* L., var. *subcordata* Hylander in Föreningens för dendrologi och parkvård årsbok Lustgården,

p. 111, 1944–45. Dr. Hylander sent me a reprint of his article and there is no doubt that the name he proposed should be taken up.—Ernest Rouleau.

CARYA OVALIS AND CARYA GLABRA IN DURHAM, NEW HAMPSHIRE, AND VICINITY

A. R. Hodgdon and Dominic P. Gangi

Most of the students of our woody flora and of the genus *Carya* in particular have considered *Carya glabra* (Mill.) Sweet to be slightly more southern than the rather closely related *Carya ovalis* (Wang.) Sargent. Deam[1] states of *C. glabra* in Indiana, "I think that most of the reports of it from the northern part of the state should be referred to as *Carya ovalis* or some of its many forms." Manning in correspondence[2] pointed out correctly to the senior author that material collected by the latter some years ago in New Hampshire and identified as *C. glabra* should probably be regarded as Sargent's *C. ovalis* var. *obovalis.* Furthermore, he advised that in the absence of any entirely typical *Carya glabra* it would in his opinion be best to treat specimens apparently intermediate between *C. ovalis* and *C. glabra* as varieties of the former. We have, therefore, for the most part been indentifying our pignuts[3] as *Carya ovalis* largely by the fruits but, nevertheless, have been confused by the fact that nearly all of our material has the predominantly 5 leaflets generally attributed to *C. glabra.*

The autumn of 1947 proved to be a season of heavy fruiting of hickories in Durham, New Hampshire, and adjacent townships. It was possible to make numerous observations in the field as well as extensive herbarium collections of both leaves and fruits. We could, therefore, correlate fruit- and leaf-characteristics in scores of trees. As a result of our studies in 1947 and again in 1948, we can now offer three statements with a feeling of some certainty: (1) Trees with all other characteristics of *Carya ovalis*

[1] Deam, C. C. "Flora of Indiana" 370–371, 1940.
[2] Manning, W. E. Letter to A. R. Hodgdon, May 20, 1943.
[3] The name pignut has been used consistently for *Carya glabra*. The names sweet pignut, false pignut, oval pignut, etc. for *C. ovalis* seem to have given way to the name red hickory in recent years.

in this area have prevailingly 5 leaflets rather than 7, though occasionally trees occur with mostly 7; (2) *Carya glabra* is found in Durham and adjacent townships; (3) three of the so-called varieties of *Carya ovalis* recognized by Sargent[4] and maintained by recent authors are evident in our population of the species here concentrated at the extreme northeastern limit of the range.

Taking each of these points in its turn: (1) On the basis of our intensive but admittedly local observations, we question the general and hardly qualified use of the distinction of number of leaflets to separate *C. ovalis* from *C. glabra*. This character has been in rather consistent use. For example, Sargent and Deam in the aforementioned treatments both state of *C. ovalis*, "—leaflets 7, rarely 5—", whereas of *C. glabra* "—leaflets 5, rarely 7—". In herbaria, where fruits are often not present, identifications have apparently been made frequently on the basis of number of leaflets. While this may be a safe procedure over the larger part of the range of *C. ovalis,* we question its validity in the northeastern part of the range. If over the remaining part of the range of *Carya ovalis,* which we have not investigated, the predominant number of leaflets fairly consistently is 7 rather than 5, it would appear that we have a unique population in our area perhaps truly deserving a varietal designation.

(2) *Carya glabra* is evidently present in Durham. Its highly distinctive fruits closely match the more typical herbarium material as well as descriptions. Briefly the fruits of *C. glabra* are usually described as fig-like with a somewhat stipitate base; the husks are somewhat thicker than those of *C. ovalis* and do not readily split below the middle at maturity. The seeds are mildly astringent rather than sweet without astringency as in *C. ovalis* (a highly subjective distinction at best, however). The leaf- and bark-characters of pignut in our area are much less reliable than those of the fruits. The leaflets of *C. glabra* are supposed to be 5 in number which agrees with our findings but this hardly serves to permit separation of *C. ovalis* which also possess 5 leaflets in most instances in our range. Similarly, the character of "bark tight" in *C. glabra* which applies satisfactorily to our *C. glabra* also in many instances applies to the local *C. ovalis*. With us, *C. glabra* is apparently much less frequent than the other.

[4] Sargent, C. S. "Manual of Trees of North America", 194–195, 1933.

(3) *Carya ovalis* exhibits a striking degree of variation in the limited area studied. We have been able to recognize several varieties. Briefly these are: (1) var. *obovalis* Sargent with fruits obovoid, (2) var. *odorata* (Marsh.) Sargent with small nuts and inner surface of fresh husk with a resinous odor, (3) var. *obcordata* (Muhl. & Willd.) Sargent with nuts oblong and cordate or obcordate at the apex. Two facts should be noted: (1) that fruits from the same tree were very uniform in all taxonomic characteristics. (2) While there were many overlapping tendencies between trees, it was nevertheless possible to relate each individual by its fruit-characteristics to the typical species or to one of the above-named varieties according to the descriptions and keys of various authors including Sargent, Deam and Rehder.

Perhaps these purely local observations, added to the information obtained elsewhere by others, may contribute in a small way to a better understanding of the taxonomic and distributional features of our northeastern hickories.

N. H. Agricultural Experiment Station,
University of New Hampshire, Durham, N. H.

Death of Charles Alfred Weatherby.—With great sorrow we record the sudden death on June 21 of Mr. Weatherby, Associate Editor of Rhodora since 1929. An appreciation and sketch will be published in a subsequent number.—Eds.

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CONTENTS:

Lindera melissaefolia. *Julian A. Steyermark.* 153

Epipactis Helleborine again. *Ethel E. Upham.* 162

Ranunculus texensis Engelm. antedated by R. laxicaulis (T. & G.) Darby. *Haskell Venard.* 164

Some Corrections of Professor Jones's List of Vascular Plants from St. Louis County, Minnesota. *Olga Lakela.* 167

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LINDERA BENZOIN. FIG. 1, fruits and pedicels, from *Millspaugh*, Binghampton, N. Y. LINDERA MELISSAEFOLIA. FIG. 2, fruits and pedicels, from *Steyermark 66947*, Ripley Co., Mo.; FIG. 3, portion of leafy branch, from *Steyermark 66947*, Ripley Co., Mo.

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LINDERA MELISSAEFOLIA

JULIAN A. STEYERMARK

(Plate 1151)

THE common Spice Bush (*Lindera Benzoin* (L.) Blume) is a well-known aromatic shrub of eastern and central United States and Canada. Its more southern relative, *Lindera melissaefolia* (Walt.) Blume, on the other hand, is very little known, and, if we may judge by preserved herbarium material, one of the rarest shrubs of the United States.

Although known since 1788, when Walter (Flora Caroliniana, p. 134) first described it under the name *Laurus melissaefolia*, during the past 160 years it has been collected but a few times, and is poorly represented in American herbaria. Subsequent to 1788 *Laurus diospyroides* Michx. (Fl. Bor.-Am. **1**: 243. 1803), a photograph of the type of which has been kindly loaned me by the Director of the Gray Herbarium, and *L. Diospyrus* Pursh (Fl. Am. Sept. **1**: 276. 1814) were referred by their respective authors (doubtfully in the case of Michaux) to Walter's *Laurus melissaefolia*.

Presumably, Walter's material was collected within a radius of 50 miles of his plantation, located "at the southern edge of the great swamp bordering the Santee River, in the coastal plain . . . within the boundary of present-day Berkeley County", South Carolina (Maxon, Wm. R. Thomas Walter, Botanist. Smiths. Misc. Coll. **95**, no. 8: 1, 4. 1936). For his *Laurus diospyroides* Michaux does not indicate any specific localities, but does observe "Promiscue cum *L.*[aurus] *geniculata* habitans".

Since he states (p. 244) "in aquis stagnantibus Carolinae" for *Laurus geniculata* Walt. (= *Litsea aestivalis* (L.) Fern. Rhodora **47:** 140–142. 1945), we may assume that the type of his plant, preserved in the Museum d'Histoire Naturelle de Paris, came from either North or South Carolina.

The early authors (Walter, Michaux, Pursh, Nuttall, and Nees ab Esenbeck) had no trouble in distinguishing *Lindera melissaefolia* from the more common and widespread *L. Benzoin.* Walter's original diagnosis (p. 134), in part, "foliis cordato-lanceolatis venosis, membranaceis, subtus pubescentibus", and that of Michaux (p. 243), in part, "foliis oblongo-ovalibus, subtus subtomentosis", emphasized the shape of the leaves, their prominent venation, and their pubescence on the lower surface. Michaux, and later Pursh, were also impressed by the low stature of the plant, referring to it as "humilis". The obtuse or subcordate base of the blade immediately distinguished it from the cuneate or tapering one found in *L. Benzoin.*

Beginning, however, with the treatment of the genus *Lindera* in A. De Candolle's Prodromus **15**, part 1: 244. 1864, reference was made by Meissner under *L. melissaefolia* to a collection from the state of Missouri. Engelmann's name appears in the list of collectors cited by Meissner. An examination of a fruiting specimen occupying the left-hand side of the sheet in the Engelmann herbarium of the Missouri Botanical Garden shows that it has sparse pubescence on the midrib of the lower surface of the leaf of otherwise typical *Lindera Benzoin.* This is the only specimen in the Engelmann herbarium with foliage; the shape and acute base of the blade show, however, that this collection should have been referred to *Lindera Benzoin* instead of to *L. melissaefolia.* The fact that it had the midrib of the lower surface of the blade pubescent may have misled Meissner to include it under *L. melissaefolia.* along with the other specimens cited from Carolina and Alabama (the Virginia reference has not been substantiated by any collection known to have come from that state). Since that time, many collections having pubescent petioles and the leaf-blade more or less pubescent on the lower surface have been named indiscriminately as *Lindera melissaefolia* or *Benzoin melissaefolium.*

It was not until 1935, when Palmer & Steyermark described *Ben-*

zoin aestivale var. *pubescens* (Ann. Mo. Bot. Gard. **22**: 545. 1935) that the confusion caused by this pubescent *B. aestivale* was made known. On the basis of such pubescent specimens *Benzoin melissaefolium* had been given a wide range extending westward to Illinois and Missouri. The error of inclusion of this species for Missouri was perpetrated by various manuals and local floras. Tracy in his "Catalogue of the Phaenogamous and Vascular Cryptogamous plants of Missouri" in 1886, cites (p. 74) *Lindera melissaefolia* from Missouri, based upon a collection from Greene Co. by Professor Edward M. Shepard. Examination of Professor Shepard's plant reveals it to be *Lindera Benzoin* var. *pubescens* (*Benzoin aestivale* var. *pubescens*). Therefore, no true *L. melissaefolia* had ever been found in Missouri. Actually, the recognition of the pubescent variety of *Benzoin aestivale* left *B. melissaefolium* as a rare and little known species, confined, as far as the records up to 1935 went, to the Coastal Plain and Piedmont regions of the southeastern states.

During the latter half of October, 1948, on a collecting trip in the swampy lowland section of southeastern Missouri (actually an extension of the Mississippi Embayment of the Gulf Coastal Plain), in Ripley County, I chanced upon an area of undulating sand hills and depressions, 4 miles south of Naylor, near the Arkansas state line, and about ½ mile west of the boundary separating Butler and Ripley counties. Most of the sandy knob land and higher ground were under intense cultivation, devoted to the raising of cotton, watermelon, squash, and beans. But between the knobs in the depressions, which, during the spring and early summer, are inundated and swampy, occurred a dense forest dominated by *Quercus palustris* and *Fraxinus tomentosa* (*F. profunda*). In a few spots in the area, some of the knolls, protruding above these depressed flats, are still covered by the original forest, and here occur *Acer saccharum*, *Euonymus americanus*, *Aralia spinosa*, *Corylus americana* f. *missouriensis*, *Asimina triloba*, *Cornus florida*, *Hydrastis canadensis*, *Desmodium rotundifolium*, and many other species not found in the wetter depressions.

While walking around the base of one of these knolls, I suddenly caught sight of a scarlet-fruited plant growing in an adjacent depression. Coming closer, I was immediately intrigued

by the relatively large size and abundance of the fruit and by the low stature of the plant. Although I had seen the common Spice Bush (*Lindera Benzoin*) just a while ago in the same area, this plant was distinctly marked by the thinner foliage with the base of the blade obtuse or rounded, and the lower surface conspicuously veined and without the pale or grayish-white color on the lower surface typical of *L. Benzoin*. The leaves also were in a drooping position instead of erect-ascending or spreading as in *L. Benzoin*. Looking around us, Mrs. Steyermark and I discovered that we were standing actually at the edge of a large colony of these shrubs which were covering the depression. All the shrubs were equally low-growing (from 2–3 feet high, although in another colony observed later, some were taller), and formed a dense low thicket. The numerous large scarlet fruits were conspicuous and very beautiful as they stand at this time of the year against the dark dull green foliage. I knew I had never before seen such a shrub anywhere, but, from what I had just observed, I judged that I had found the rare *Lindera melissaefolia*. Farmers in this region are acquainted with the shrub by the local name of "Pondberry". They state that the scarlet drupes are used locally as ammunition for "pop guns", tubular contrivances constructed from twigs of Elderberry (*Sambucus canadensis*) in this region.

Upon returning to Chicago, a critical study of the Missouri collection was made in comparison with material borrowed from the Gray Herbarium, Missouri Botanical Garden, the New York Botanical Garden, and the United States National Herbarium. In all these large herbaria there exists a total of only nineteen sheets, comprising only ten different collections, mostly all made over one hundred years ago! To the curators of these herbaria, and to the Curator of the Herbarium of the University of North Carolina, I am greatly obliged for the courtesy in loaning their material for study. Actually, loans were requested from all the herbaria of the southern states, but no specimens of true *Lindera melissaefolia* were found in the material sent by the curators of those herbaria. The following specimens of *L. melissaefolia* have been examined.

North Carolina: wet flat near White Oak, Bladen Co., July 2, 1939, *Lionel Melvin* (NY, UNC); Chapel Hill, *Prof. Mitchell*

(NY); "North Carolina", *Schweinitz* (NY); Chapel Hill, cultivated from plant collected at White Oak, 1947, *W. C. Coker* (UNC). SOUTH CAROLINA: Since Walter's Flora Caroliniana covers a radius of fifty miles from his plantation (on the banks of the Santee River), his plant described in his flora must have come from somewhere within this area. GEORGIA: margin of pond in sand-hills of Little Ocmulgee River, Montgomery Co., Sept. 10, 1903, *Roland M. Harper*, no. 1989 (F, G, MBG, NY, US). FLORIDA: "Florida", *Chapman* (NY); "West Florida", *Chapman* (NY); "Florida", herb. Chas. Mohr (US). ALABAMA: Wilcox Co., 1839, *Buckley* (US); Wilcox Co., 1840, *Buckley* (G, NY). LOUISIANA: "Louisiana", *Hale* (G). MISSOURI: large stand in wooded depression, T 22 N, R 4 E, sect. 35, 4 mi. south of Naylor, Ripley Co., October 19, 1948, *Steyermark*, no. 66947 (F, G); same locality as previously cited above, Ripley County, Missouri, March 29, 1949, *Steyermark 67084* and *67089* (staminate plants), and *67090* (pistillate plants) (F).

Evidently, then, judging by preserved collections, this shrub is a very rare one. Apparently, only three collections (including that of the present author) have been made in a wild state during the present century. Harper notes (Econ. Bot. of Alabama, p. 184. 1928) for the occurrence of this species in Alabama, that it is "a perfectly distinct species, but rare and little known. Said by Dr. Mohr to have been collected by Buckley near Allenton, Wilcox County; but apparently not seen in Alabama by any botanist in the last 75 years". Small, in his Shrubs of Florida, p. 85, 1913, states "about ponds and swamps, W. Fla.", but none of the specimens collected by Chapman in Florida mention any specific locality, nor did Small personally know the plant. Donald C. Peattie in his Flora of the Tryon Region of North and South Carolina (Journ. Elisha Mitchell Scientific Soc. **44**, no. 1, p. 210. 1928) states that "Ashe in private correspondence with the writer reports finding this shrub near Melrose. Though there is no specimen, the report is perfectly reasonable and indeed probable", while Gattinger in his "Flora of Tennessee" (p. 84. 1901) states "not so frequent like the former. Cumberland Plateau". Both of these reports probably refer to misidentified pubescent *Lindera Benzoin*, since no authentic material of *L. melissaefolia* has been found in the herbarium of the University of Tennessee, nor in the flora of the Tryon region. Deam excludes it from his "Shrubs of Indiana" (p. 327. 1924), with the

statement that "This shrub was reported by Ridgway for the Lower Wabash Valley with a question mark. Since it has not been reported by any one else, it is not included in this list." It has, as yet, not been discovered either in Kentucky or Mississippi, and the single collection labelled "Louisiana" by Hale is the only record of its presumed occurrence in that state. Among the woody flora of the Charleston, South Carolina, area recorded by Hunt (Hunt, K. W. The Charleston Woody Flora. Am. Midl. Nat. **37:** 720. 1947), *L. melissaefolia* is mentioned only parenthetically, for we are told in his introduction on p. 683 that "In addition to the species and varieties of the catalogue, the keys include such additional species . . . as might possibly yet be found here. These are distinguished from the collected species by the use of parentheses". Therefore, so far as records go, Walter's original diagnosis of the species from the Santee River area of South Carolina is the only definite area in that state from which the species has been known. A recent collection (1927) from a wooded bank of the Santee Canal in Berkeley County, South Carolina, *Wiegand & Manning*, no. 1250, belongs with the common *L. Benzoin.* This is in the vicinity of the type locality of *L. melissaefolia.*

The Missouri record of 1948 is the most western one known at present, and occurs about 400 miles by air northwest of the nearest known locality (Wilcox County, Alabama). It was at first supposed that the Missouri material might differ from the specimens of the southeastern states, but careful study of details has not revealed any marked differences. It should be noted, however, that the Missouri specimens were collected in October, when the fruits showed their greatest maturity with corresponding maximum size, both as regards the fruit and the fruiting pedicels. When seen at this stage, the fruits are larger and of an obovoid shape, and the pedicels much longer than corresponding mature stages of development in *L. Benzoin.* The summit of the fruiting pedicels in *L. melissaefolia* is also much thicker and wider than in *L. Benzoin* (see plate 1151). Good mature fruiting specimens are apparently not available in the older collections of *L. melissaefolia.* At this late time of year (October), moreover, the foliage is larger and the lower surface of the blade less pubescent than in material collected earlier in

the season. It is also possible, of course, that the pubescence is somewhat variable in its degree, not only at different seasons of the year, but also in different localities. Nuttall (Genera of North American Plants **1:** 259. 1818) noted that the fruits of *Euosmus* (Laurus) *Diospyrus* (= *Lindera melissaefolia*) were "larger than those of *E.*[*uosmus*] *Benzoin*", but he apparently is the only one to have brought out this observation. It is certainly evident in living material of this species.

Another difference not noted by earlier botanists is the fact that in *L. melissaefolia* the lowest two pairs of lateral nerves of the leaf-blades diverge at a greater angle (45–50°) from the midrib than do the successive ones above (only about 35°), thus making them at variance with the other lateral nerves (see plate 1151). In contrast, in *L. Benzoin* and var. *pubescens*, the lateral nerves are mostly all parallel to one another, diverging from the midrib at an approximately equal angle of 35–45°, thus presenting a more uniform appearance. Moreover, the much paler, almost glaucous, lower surface of the leaf-blades in *L. Benzoin* and var. *pubescens* is in marked contrast to the mostly concolorous blades of *L. melissaefolia.* As early as 1814 Pursh (Fl. N. Am. **1:** 276) noted that in *Laurus Benzoin* the blades were "subtus albicantibus". Meissner (ibid.) also states that in this species the blades are "subtus subglaucescentibus". The venation on the lower leaf surface in *L. melissaefolia* is pronounced and conspicuous, whereas in *L. Benzoin* it does not stand out as such. Of course, the size of the shrubs is quite in marked contrast, as is the shape, venation, and base of the leaf-blade, and position of the foliage.

With the differences of mature fruit and foliage well in mind, the study of the two species was pursued the following spring in order to learn what, if any, differences in flowers might occur. Accordingly, a special trip was made during the last week in March of 1949 to the Missouri locality where *L. melissaefolia* had been found the previous autumn in a fruiting condition. Mr. Henry Hamlett, a farmer and keen observer of plant-life in the region where the *L. melissaefolia* occurs, wrote me that the "Pondberry", as it is known in that locality, was flowering. On March 29, then, I was back in the haunts of this rare shrub, with the opportunity of obtaining good flowering specimens.

Although various manuals and local floras state that the flowers in *Lindera* are dioecious, this information has not been followed up by collectors. An examination of available herbarium material reveals an abundance of staminate flowering specimens of *L. Benzoin*, but practically no pistillate collections. And, of course, for *L. melissaefolia*, it has been already stated that very few collections at all exist in herbaria.

The swampy depressions, which are the habitats for the Missouri station of *L. melissaefolia*, were filled with nearly a foot of water at the time I revisited them in March. The hundreds of plants filling the depressions were studded with pale yellow clusters of flowers of this species. Some plants only 0.5 meter or less tall were flowering. To my surprise, however, most of them having conspicuous flowers, proved, upon close examination, to be staminate. With a careful search, pistillate specimens were also located, but were in the minority. They had much less conspicuous flower-clusters.

On the knolls and adjacent drier ground, isolated bushes of *L. Benzoin* occurred. Here again it was observed that the conspicuous clusters of yellow flowers were entirely staminate. Pistillate plants were located with difficulty, due to their apparent scarcity together with their more reduced inflorescences. Apparently, then, here was the reason that collectors had invariably obtained staminate material in such preponderant quantities in contrast to the paucity of pistillate material collected; the staminate plants, being showier and more frequent, have caught the attention of the collector, while the pistillate plants, on the other hand, with their less conspicuous flowers, have been passed by either as too puny or undesirable for specimens, or else have not been carefully examined in the field.

A good series of staminate and pistillate collections of both species was obtained. Several striking differences were observable in the field. One of the most interesting noted was that the old fruiting pedicels of the previous year persist in *L. melissaefolia* through the period of anthesis of the following year, whereas in *L. Benzoin* they fall off during the winter, so that when anthesis occurs the following spring, they are not in evidence, as they are in the case of *L. melissaefolia*. In the field it is also apparent that the staminate flowers are larger in *L. Benzoin* than

in *L. melissaefolia*, whereas the pistillate flowers in *L. melissaefolia* are much larger and more conspicuous than the insignificant ones of *L. Benzoin*. In both species, therefore, the staminate flowers are the showier ones, the pistillate the less conspicuous and apparently less often encountered. An additional difference was also observed in the habit of growth between the two species. In *L. Benzoin* the plant is much larger, with a bushy, much-branched habit, whereas in *L. melissaefolia* the branching is much less developed and the plants are smaller in stature.

A summary of all the differences now found between *L. melissaefolia* and *L. Benzoin* and its var. *pubescens* may be stated in key form as follows:

Large shrub, mostly 1.6–4.5 meters tall, foliage erect-ascending or spreading, fragrant when crushed, but without a sassafras-like odor; leaf-blade thickish, firmly membranaceous, acute or cuneate at base, obovate, 4–15 cm. long, 2–7 cm. wide, pale or subglaucous on lower surface, glabrous, or in var. *pubescens* more or less pubescent at least on midrib and (or) lateral nerves of lower surface; lower surface of blade without conspicuous venation; lateral nerves mostly all parallel, diverging from midrib at an angle of 35–45°; petiole and buds glabrous, or in var. *pubescens* pubescent, 5–20 mm. long; fruiting pedicel slender, 3–4 mm. long, not conspicuously enlarged at summit, only 1–1.5 mm. wide at summit; mature fruit (in dried state) elliptic-oblong, 8–10 mm. long, 5–7 mm. wide; seed suborbicular, 7 mm. long, 5.5–6 mm. wide; winter buds glabrous, or in var. *pubescens* somewhat villous; staminate calyx-segments relatively broader, 1.5–2 mm. wide; staminate pedicels glabrous; filaments 0.3 mm. wide, dilated at base, 1.5 mm. long; pistillate calyx-segments relatively shorter and narrower, 1.5 mm. long, 0.5–1 mm. wide; pistillate pedicels relatively shorter, 1–1.5 mm. long; fruiting pedicels deciduous, not persistent to the next flowering season *Lindera Benzoin* and var. *pubescens*

Low shrub, 0.6–2 mm. meters tall; foliage drooping, when crushed with a sassafras-like odor; leaf-blade thin, membranaceous, oblong, obtuse or rounded at base, 5–16 cm. long, 2–6 cm. wide, concolorous, slightly to densely pubescent on lower surface; lower surface of blade with conspicuous pronounced venation; lowest two pairs of lateral nerves not parallel to ones above, conspicuously more ascending and diverging from midrib at 45–50° angle, in contrast to the other lateral nerves which diverge at an angle of approximately 35°; petiole and buds pubescent, 5–15 mm. long; fruiting pedicels stout, 9–12 mm.

long, conspicuously enlarged at summit, 2.5–3 mm. wide; mature fruit (in dried state) elliptic-obovoid, 10–11.5 mm. long, 7–8 mm. wide; seed suborbicular, 7 mm. long, 6.25 mm. wide; winter-buds villous; staminate calyx-segments 1–1.25 mm. wide; staminate pedicels pilosulous; filaments slender, narrower, 0.1 mm. wide, not dilated at base, 1.8–1.9 mm. long; pistillate calyx-segments 1.5–2 mm. long, 1–1.25 mm. wide; pistillate pedicels 2.5 mm. long; fruiting pedicels persistent from previous year and lasting to time of anthesis. . . . . *Lindera melissaefolia.*

Since *Lindera* has been conserved over *Benzoin*, it is, of course, necessary to use the names *Lindera Benzoin* (L.) Blume, and var. *pubescens* (Palmer & Steyermark) Rehder, and *Lindera melissaefolia* (Walt.) Blume, as brought out by Rehder and by Fernald (see Journ. Arn. Arb. **20:** 413. 1939, and Rh. **47:** 140–142. 1945).

Chicago Natural History Museum

EPIPACTIS HELLEBORINE AGAIN

Ethel E. Upham

It is a pleasant experience for the botanist, expert or amateur, in the herbarium or in the field, when his find proves to mark an extension of range for the species. Such an experience was mine last summer. Three of us were exploring the rocky, thinly wooded bank of a little brook in the town of Southbridge, Massachusetts, and I, outdistancing the others for the moment, came upon an unfamiliar orchid, which, however, was soon identified as the interesting *Epipactis Helleborine* (L.) Crantz.

About fifteen plants of the orchid were found in the vicinity, approximately half of which were young plants without flowers' The date was July 25, and many of the blossoms which we saw were past their prime. One specimen was taken for the herbarium of the New England Botanical Club, and another is preserved in alcohol at the Ames Orchid Herbarium. An interesting feature of the latter is a fragment of rock to which the roots of the plant cling tenaciously. The roots had grown so tightly into the crevices of the rock that the latter had to be shattered before the plant could be taken.

A month or so later, in the course of a field trip of the Connecticut Botanical Society in the eastern edge of the town of Coven-

try, a single orchid, past blooming, was found. Though the plant was not seen by those members of the party best able to make positive identification, the group seemed satisfied that it could be none other than *Epipactis Helleborine.*

The first recorded finding of *Epipactis Helleborine* dates back an even seventy years, to August 2 and 6, 1879, on which respective dates it was found in the vicinity of Syracuse, N. Y., by Mrs. M. O. Rust and Miss M. P. Church.[1] New stations were discovered in 1881, 1882, and 1894. Metcalf and Griscom listed about twenty-five stations in New York State in 1917, and by 1933 the plant's range had extended eastward to the Hudson River. New Jersey has, or had, a single station, and western New England has now become fairly familiar with the plant. It is becoming quite common in Berkshire County, Massachusetts. The first known station east of the Connecticut River was in Plainfield, New Hampshire [see RHODORA, **44:** 456 (1942)], and this was followed a few years later by its discovery on an island in Lake Winnepesaukee, in the town of Meredith [see RHODORA, **49:** 60 (1947)]. The Southbridge and Coventry stations are believed to be the first ones east of the Connecticut in southern New England, and so denote a decided extension of range in that area.

The now accepted cognomen of *Epipactis Helleborine* is not the only one by which the plant has been known. *Epipactis latifolia* and *Serapias Helleborine* are well-known synonyms; *Amesia latifolia* was also applied to it, and there is little doubt that *Epipactis viridiflora* and *E. Helleborine* var. *viridans* (sometimes written *viridens*) refer to the same plant.

A brief glance at the literature regarding this interesting orchid is conducive to a more thorough reading. Torreya, **30**: 46–50 (1930) gives Zenkert's interesting account of the remarkable behavior of the plant in the city of Buffalo, where it persisted for years as a weed. RHODORA, **50:** 236 (1948) tells of its distribution and habits in Canada. *Amesia latifolia* is mentioned as

[1] The authority for this statement is H. D. House's article in Torreya, 33: 133 (1933). It, in turn, refers to a note in Bull. Torrey Bot. Club, 6: 329 (1879), which mentions the names of the ladies and closes with the following observation: "No plants are so eagerly sought for as orchids. Yet Epipactis, all these centuries, has shut itself up, waiting for the sharp eyes of the ladies of the Syracuse Botanical Club What new discoveries are to be expected from their penetrating glances. *Place aux dames.*"

having been found in Wisconsin [RHODORA, **33:** 140 (1931)]. Since there are also records of this orchid's occurrence in Missouri and Montana [in RHODORA, **42:** 521 (1940)], it seems apparent that it has spread in various directions from the probable place of its original introduction, western New York State.

One author (House) states that *Epipactis Helleborine* seems to prefer calcareous soil, and this statement is probably true. Zenkert, however, says it is not particular about the chemical composition of the soil, but is always associated with woods, past or present. It is said to prefer situations in the wild, but its behavior in the city of Buffalo seems to prove that it will grow in quite different situations.

Whatever the case may be, *Epipactis Helleborine* evidently takes kindly to our region. We can but conclude that a hunt for it on any botanical expedition in a habitat not manifestly impossible for its growth may be worth our while. My own intention is to search my favorite "South Woods" for it as thoroughly as my limited opportunities will allow. These woods have a habit of not letting me down; they are good woods, with rich soil which, though containing little lime, may quite possibly harbor a specimen or a colony of this interesting orchid. The present season will very likely bring to notice a number of new stations for the plant in New England.—EAST WOODSTOCK, CONN.

RANUNCULUS TEXENSIS ENGELM. ANTEDATED BY R. LAXICAULIS (T. & G.) DARBY

HASKELL VENARD

SINCE the publication of Gray's Manual, ed. 7, 1908, *Ranunculus laxicaulis* (T. & G.) Darby has been used with two different meanings: 1) incorrectly, as a supposed earlier name for *R. ambigens* Wats., and 2) correctly, for the entity erroneously called *R. oblongifolius* Ell. in Gray's Manual, ed. 7, 1908 and in Britton & Brown's Illustrated Flora, ed. 2, 1913.

The correct application of the name was demonstrated by Fernald in RHODORA **41:** 541–2. 1939, and has not been questioned up to the present writing. It is in no sense a nomen ambiguum et confusum, and yet it has been adopted and aban-

doned in both its meanings, mostly due to the discovery of supposedly earlier synonyms, with a frequency that is almost unparalleled.

The name is usually cited as *R. laxicaulis* (T. & G.) Darby, Bot. S. States 204. 1855.[1] On the basis of this date, it was recently reduced to the synonymy of *R. texensis* Engelm. (1845) by Dr. Lyman Benson in "A Treatise on the North American Ranunculi", Am. Midl. Nat. **40:** 194. 1948.

The binomial was actually first published by Darby in Man. Bot. S. States, Part II. 4. 1841.[2] The citation of the part is necessary because of the separate pagination of the two parts, although they are included in one volume.

Although the wording of the descriptions is identical in the two works, Darby unfortunately cited no authorities for his binomials in his earlier work. Consequently, in complete citations, the later reference should be added to the earlier one in order to show that Torrey and Gray were the authors of the basonym.

One more point is of interest. On page 6 of the preface to the 1855 work, Darby refers to "a work the author published in 1842", which is obviously the one bearing 1841 on the title-page. This is a strong indication, though not proof, that the actual date of publication was in 1842. In the absence of proof to the contrary, the date on the title-page is assumed to be correct. Cf. the example given under Art. 45 of the International Rules concerning the publication date of the first volume of Adanson's "Familles des Plantes".

In order to trace the history of *R. laxicaulis,* it may be helpful to give the complete synonymy of both *R. laxicaulis* and *R. ambigens,* including references to nomenclatural and taxonomic treatments. The letters in parentheses refer to the use of a name in the following current manuals: G—Gray's Man. ed. 7.

[1] Darby, John. 1855. Botany of the Southern States. In two parts. Part I Structural and Physiological Botany and Vegetable Products. Part II. Descriptions of Southern Plants. Arranged on the Natural System. Preceded by a Linnaean and a Dichotomous Analysis. New York: A. S. Barnes & Co. Cincinnati, H. W. Derby. John M. Cooper, Savannah. 612 pp.

[2] Darby, John. 1841. A Manual of Botany, adapted to the productions of the Southern States. In two parts: Part I. Vegetable Anatomy and Physiology. Part II. Descriptive Botany, arranged on the Natural System, preceded by an Analysis. Macon: published by Benjamin F. Griffin. 156 + 344 pp.

1908. B—Britton & Brown, Ill. Fl. ed. 2. 1913. S—Small, Man. SE. Fl. 1933. F—Fassett, Man. Aquat. Pl. 1940.

Ranunculus laxicaulis (T. & G.) Darby

R. Flammula L., var. *laxicaulis* T. & G. Fl. N. Am. **1:** 16. 1838.

R. pusillus Poir., var. *denticulatus* T. & G. l. c. (fide Benson in Am. Midl. Nat. **40:** 194. 1948.)

R. laxicaulis (T. & G.) Darby Man. Bot. S. States, Part II. 4. 1841 (?1842), as "R. laxicaulis"; Bot. S. States 204. 1855, as "R. laxicaulis (T. & G.)". Cf. Fernald in Rhodora **41:** 541–2. 1939, also Benson in Bull. Torr. Bot. Cl. **69:** 308. 1942. The page given by the Index Kewensis, "204", shows that the 1855 work, or one of its numerous later reprints, was used as the basis of the listing. (F)

R. texensis Engelm. apud Engelm. & Gray in Bost. Jour. Nat. Hist. (Pl. Lindh.) **5:** 210. 1845 (fide title-page). Cf. Benson in Am. Midl. Nat. **40:** 194–6. 1948, also Benson in Bull. Torr. Bot. Cl. **69:** 308. 1942, where the date of publication is given as 1847, apparently as a result of misinterpretation of the Index Kewensis entry, which refers to the date of the volume.

R. oblongifolius sensu many American authors, not Ell., which is *R. pusillus* Poir. Cf. Fernald in Rhodora **41:** 541–2. 1939. (G, B, S)

R. mississippiensis Small in Bull. Torr. Bot. Cl. **27:** 277. 1900. (fide Benson in Am. Midl. Nat. **40:** 194. 1948.) (S)

R. laxicaulis Darby, var. *mississippiensis* (Small) Benson in Bull. Torr. Bot. Cl. **69:** 309. 1942. ("A rather poorly differentiated variety.") Reduced to synonymy of *R. texensis* Engelm. by Benson in Am. Midl. Nat. **40:** 194. 1948.

Ranunculus ambigens Wats.

R. Flammula L., var. *major* Hook. Fl. Bor. Am. **1:** 11. 1829. (fide Benson in Am. Midl. Nat. **40:** 183. 1948.)

R. alismaefolius sensu American authors of the middle 19th century, not Geyer, which is a plant of the western U. S. (e. g. Chapm. Fl. South. U. S. ed. 1. 1860, also Gray Man. ed. 5. 1867.)

R. ambigens Wats. Bibl. Ind. N. Am. Bot. **1:** 16. 1878. Proc. Am. Acad. **14:** 289. 1879. Cf. Fernald in Rhodora **38:** 173–5. 1936 and Benson in Am. Midl. Nat. **40:** 183, 185. 1948. (Used by Watson and Coulter in Gray's Man. ed. 6. 1889 and by Gray in Synopt. Fl. 1895.) (F)

R. obtusiusculus sensu many late 19th and 20th century authors, probably not Raf., which is a nomen dubium ("confusum" according to Benson, l. c.) Cf. Fernald in Rhodora **38:** 173–5. 1936. (B, S)

R. ambigens Wats., var. *obtusiusculus* sensu Davis, Minn. Bot. Stud. **2:** 494. 1900, probably not *R. obtusiusculus* Raf., basonym, nomen dubium.

R. laxicaulis sensu Robinson and Fernald in Gray's Man. ed. 7. 395. 1908, not *R. Flammula* β *laxicaulis* T. & G., basonym. (G)

ATLANTA, GA.

SOME CORRECTIONS OF PROFESSOR JONES'S LIST OF VASCULAR PLANTS FROM ST. LOUIS COUNTY, MINNESOTA.—In the American Midland Naturalist, **40:** 475–492, 1948, there appeared a list of vascular plants from St. Louis County, Minnesota, by Professor George Neville Jones. The list of some 428 species is based on his own collections, on those of Professor W. V. Balduf and of E. J. Hill, these last dating back to 1889.

During the last fifteen years I have devoted a considerable amount of time to collecting and studying the plants of St. Louis County for eventual writing and publication of a flora. Because Professor Jones reported a number of species which I have not encountered in the area, species not previously known in the state flora, it became necessary to verify his findings by examination of his collections. Naturally I asked Professor Jones for the privilege of seeing his plants, especially the species in question. My request for the loan of specimens was courteously granted.

A number of species in Professor Jones's list appear under names which clearly do not conform to accepted rules. However, the purpose of this note is not to dwell upon problems in nomenclature, but rather to straighten out his list by eliminating species erroneously credited to the state by misidentifications of common plants.

Thus, the report of the far western *Woodsia oregana* D. C. Eaton, Jones no. 18091, rests on a misdetermined specimen of *Cystopteris fragilis* (L.) Bernh. Similarly, *Carex Grayii* Carey, Jones no. 18182, is a sedge of common occurrence throughout the area, namely, *C. intumescens* Rudge. *Rumex occidentalis* Wats., Jones no. 18096 and two other collections, is *R. Patientia* L., a spreading weed. Some collectors have confused *Viola canadensis* L. with *V. rugulosa* Greene (for differentiating characters see Fernald in RHODORA **51:** 52, pl. 1133. 1949) but Jones no. 18217 labeled as *V. canadensis* is *Viola pensylvanica* Michx. var. *leiocarpa* (Fernald & Wiegand) Fernald. Lastly, *V. palustris* L., Jones no. 18236, is *V. incognita* Brainerd, a ubiquitous white-flowered violet of Minnesota bogs.

An area like northern St. Louis County is not without possibilities for new discoveries and its rich flora affords opportunities for additional records. The remaining species in Professor Jones's list of "possibility" fall under the latter category, namely additional records; they have previous authors and they can be accounted for in synonymy. It may not be amiss to point out a few examples.

Agropyron subsecundum (Link) Hitchc. was reported for the state in Manual of the Grasses of the United States, p. 237, fig. 456. As to *Eleocharis palustris* L., most state collections have been referred to *E. Smallii* Britton (see Svenson in Rhodora, **41:** 98, map 64. 1939 and **49:** 62–67. 1947). Warren Upham reported it in the Catalogue of the Flora of Minnesota, also a reference for a few other species enumerated by Professor Jones, including *Eriophorum tenellum* Nutt. Regarding *Streptopus roseus* Michx., Jones no. 18384, the plant is not different from all the other Minnesota collections identified as *S. longipes* Fernald, listed by Moore and Tryon in Preliminary Checklist of the Flowering Plants, Ferns and Fern Allies of Minnesota, p. 25. Dr. Fassett reduced it to a variety of *S. roseus* but the typical *S. roseus* has an eastern distribution. See Fassett in Rhodora **37:** 100, map 3 (1935). Rosendahl and Butters reported *Salix vitellina* L. as a variety of *S. alba* in Minnesota Trees and Shrubs, p. 70. For *Rorippa hispida* see Butters and Abbe in Rhodora **42:** 26 (1940) for the combination *R. islandica* var. *hispida*. And *Geum strictum* Ait. is listed by Moore and Tryon p. 47 in their checklist, above cited, under the name, *Geum aleppicum* Jacq. var. *strictum* (Ait.) Fernald, but unnoticed by Professor Jones in making comparisons with his list. Lastly, Rydberg cited Minnesota specimens of *Stachys borealis*, Brittonia, **1.** 95.—Olga Lakela, University of Minnesota, Duluth Branch.

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CONTENTS:

Charles Alfred Weatherby, Botanist and Helper of Botanists (with Portrait). *M. L. Fernald.* 169

Bibliography of Charles Alfred Weatherby. *M. L. Fernald and Bernice G. Schubert.* 179

Note on Chrysosplenium iowense. *Hiroshi Hara.* 191

Errors of Citation in Agrostis and Convolvulus. *M. L. Fernald.* 192

Contributions from the Gray Herbarium of Harvard University—No. CLXX. The American Barbistyled Species of Tephrosia (Leguminosae). *Carroll E. Wood, Jr.* 193

The White Form of Aster puniceus, var. firmus. *Haskell Venard.* 231

Basicladia in Maine. *R. M. Chute.* 232

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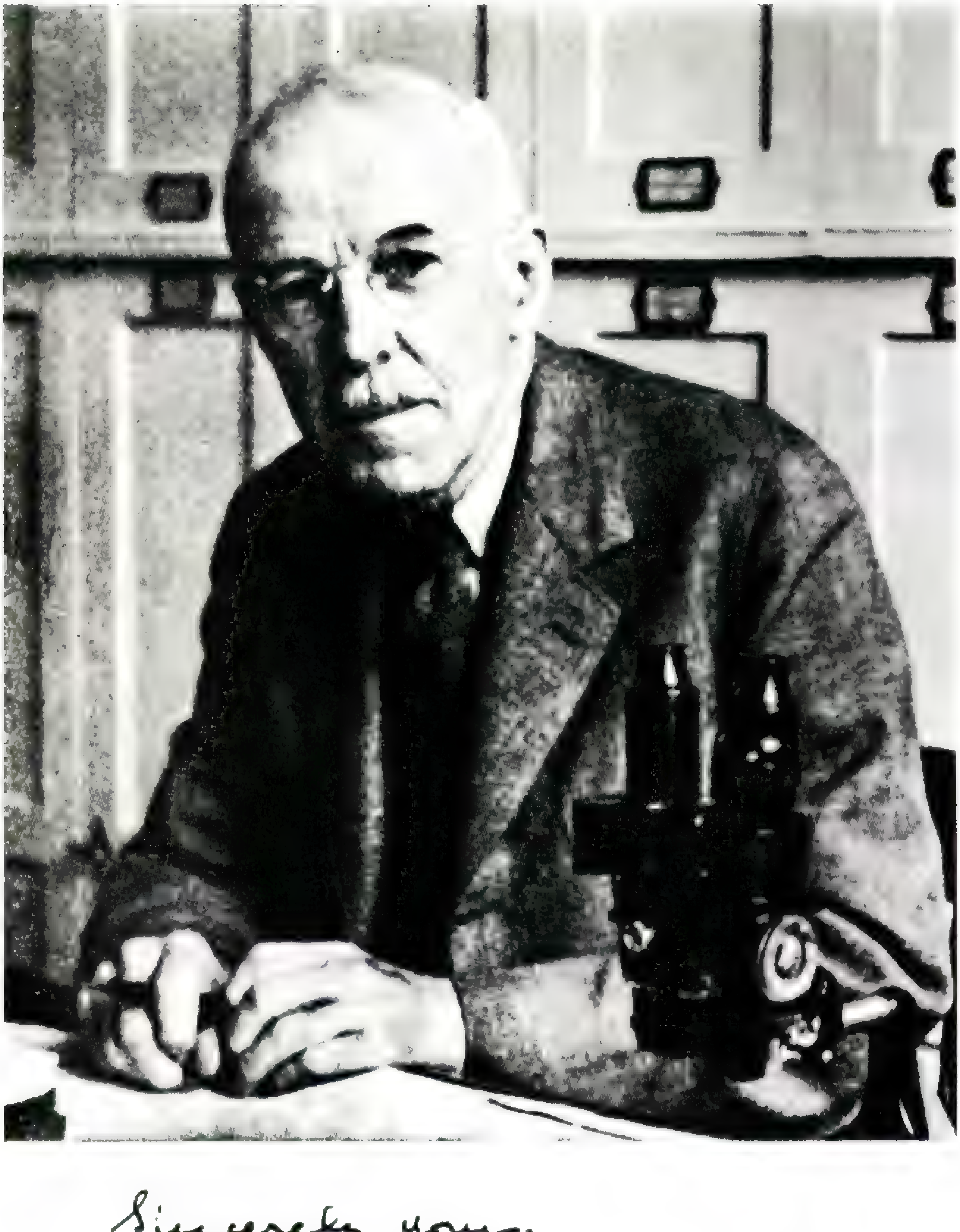

Sincerely yours,
C. A. Weatherby

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CHARLES ALFRED WEATHERBY, BOTANIST AND HELPER OF BOTANISTS

M. L. FERNALD

(With portrait)[1]

SYSTEMATIC botanists, and especially workers on the *Pteridophyta,* were saddened and almost shocked by the sudden death of Alfred Weatherby from a blood-clot early in the morning of June 21 last. Weatherby had so long been leaned upon for careful decisions regarding the classification of ferns, intricate questions in nomenclature and bibliography and matters of style in botanical writing that it seemed inconceivable that his always patient helpfulness to everyone must so soon cease. His place can hardly be filled.

CHARLES ALFRED WEATHERBY, intimately known as Alfred, was born on Christmas day, 1875, the son of Charles Nathaniel and Grace Weld (Young) Weatherby, at Hartford, Connecticut. In his own words[2], "Except for three years in Colorado Springs (which I remember as a place where one fell into irrigating ditches and had nose-bleed), I was brought up in East Hartford, then a country village with a hundred-foot wide street shaded by old elms, without electric lights, gas, telephones, sewers, city water, plumbing, or pasteurized milk, where one wore a bag of camphor

[1] The photograph was taken in the Herbarium of the Royal Botanic Gardens at Kew, in July, 1939, by the eminent pteridologist, Mr. FRANCIS BALLARD. The engraving is contributed, as his expression of admiration, by Mr. THOMAS F. BURBANK of the Wright Company, Engravers.

[2] The quotations regarding his own life are taken directly from Weatherby's brief and always modest autobiographical memoranda in the several printed Reports of the Class of 1897 of Harvard College.

hung about one's neck to fend off contagious disease, and where everybody was definitely more contented than now when they have all the above-mentioned blessings, no trees, a hundred feet of concrete pavement and rows of filling stations". In other words, he had the simple and unsophisticated boyhood of most boys of his generation who grew up in villages or small towns but who often had sulphur substituted for camphor in the bag suspended on a string from the neck.

The Hartford high school being then unable to fit boys for Harvard, Alfred was sent to local private schools and finally entered Harvard with the class of 1897, he stating, fifty-four years later: "I rather think I was the second boy to go to Harvard from Hartford since colonial times, speeded thither by the prediction of an old family friend that I should return a Unitarian and a free-trader. What I did learn was never to despise authority in intellectual matters and never to accept it unquestioned"; the latter most valuable intellectual attitude perpetually brought to bear in his future scientific writings. In college Weatherby concentrated in literature and allied fields, led a somewhat retiring life, with his special friends those of scholarly interests, joined none of the generally recognized college "clubs" (except the local chapter of *Delta Upsilon*, and a little exclusive group of eight congenial souls known, at least to themselves, as the Epicureans and who, Mrs. Weatherby informs me, kept up regular stimulating and amusing communications) nor any athletic teams. He was, therefore, of the quiet, undemonstrative and non-athletic type (as was, also, the present writer) whom some recent spokesmen would exclude from college as poor investments. He graduated with highest honors (*summa cum laude*), a fact which he modestly omitted from his published autobiographical notes, and as a member of *Phi Beta Kappa*. A year in the Harvard Graduate School gave him his A.M. in modern languages.

Five years of the closest study, without much physical activity, proved too much for his naturally limited strength, for in 1903 he wrote: "since I left Harvard in 1898, my health has been so poor that I have been unable to do any regular work". In a later summary he said: "I was an invalid for five years, twice given up by my physician, and was never really rugged there-

after. From this experience I learned that literature, my chief study in college, was for me a poor support *in extremis* and that science (I had botanized as a hobby) offered a much firmer foothold". More concrete as to his entry into a scientific field was his statement in 1912: "For a long period it was desirable for me to be as much as possible out of doors. Thereby an interest which I always had in the life of woods and fields, especially in plants, was stimulated until it became paramount". Thus the fields of botanical taxonomy, bibliography and the technical study of nomenclature became the gainers. Five years of intensive concentration in the literary field, followed by five years of invalidism, saw his start in a new and absorbing interest, and leaders in the classification of vascular plants the world over have applauded the scholarly advances in these subjects made by a seriously handicapped worker who never took a formal course in botany. He had, however, at his fitting school, the Collins Street Classical School in Hartford, and in his five years of devotion to literature at Harvard[1] acquired a linguistic background which was indispensable in the specialized field in which he became one of the most respected authorities—a field in which the great basic works were written in Latin and in which all new entities must, by International agreement, be described in Latin (instead of English, Polish, Chinese, Russian or other languages) in order to have validity. If he had been under the influence of those pragmatic scientists who today decry a classical background as a "waste of time" he would have been in the unfortunate position of those of us who, keenly interested in taxonomy and its related disciplines, have had to learn the hard way, by finding good models of the old school and trying to imitate their Latin. Or, if he had had only the minimum of training in rhetoric, syntax, philology and accurate composition nowadays allotted to students in the scientific fields, he could not have entered a polemical subject such as brewed for some time in Science in 1944. Toward the end of that particular discussion Weatherby published in Science for May 5, 1944, the following characteristic note:

[1] At a time when the elderly Francis J. Child and A. S. Hill headed a group of such younger masters in English and allied fields as Briggs, Barrett Wendell, Kittredge, F. N. Robinson and others.

"HORSE SERUM" A COMPOUND WORD

The discussion of "horse serum" has already reached considerable length, but it may be permissible to make one more point—namely, that every one concerned has misinterpreted the nature of the disputed phrase. It is not a case of one noun being used as an adjective to modify another; it is a compound noun, exactly analogous to such Greek compounds as thermometer. The first member takes the place, not of an adjective, but of a phrase. "Horse serum" is serum from a horse; "fence post" is post of a fence; "rat poison" is poison for rats. Thermometer, if its first member were adjectival, would mean a "hot meter," not a measure of heat. In most such cases, the compound has a special and definite meaning, not conveyed by an adjective and noun. Had this been understood, neither the original editorial faux pas nor the resultant burst of argument need have occurred. The author (or, if he forgot it, the editor) would merely have inserted a hyphen between "horse" and "serum" and all would have been well.

That the situation was not understood is partly because, though the use of compounds in place of prepositional or other phrases in English has increased in recent years by leaps and bounds, we have not yet developed a consistent or in any way adequate orthography for indicating them. This is admirably illustrated by the playful contributor who wrote "horse sense" and "horse-laugh" in the same sentence. The makers of the Century Dictionary perceived the usefulness of the hyphen as an indicator, but few have followed them. So long as we offend the verities by writing compounds as separate words—which they are not—we shall have confusion and wrangles like the present.

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In the same vein but we hope not prophetic was his article on *Compound Words in present-day English*, published in Science for May 5, 1939. A single paragraph suffices to show a master's hand:

Thirty years ago every one, probably, would have written "Department of Biology". Now half the colleges in the United States have "Biology Department", or the like, on their stationery. Certainly, thirty years ago no one would have put forth such a title as "Cost Analysis of Scholarly Periodical Printing". Then it would have read: "An Analysis of the Cost of Printing Scholarly Periodicals". In time, as we become more definitely conscious of what we are doing, it may read: "Costanalysis of Scholarlyperiodicalprinting".

After seriously entering botany as an amateur, Weatherby soon found himself drafted by the Connecticut Botanical Society as a member of the Committee to prepare a flora of the state, the *Catalogue of the Flowering Plants and Ferns of Connecticut*, published in 1910. The other members of the Committee were amateurs with remarkably full field-knowledge of their areas but

to Weatherby fell the task of coördination, the checking of recent revisions and the translation of specific and varietal names. These responsibilities brought him to the Gray Herbarium, where his unusual capacity for painstaking work was promptly recognized. He spent much of his time in the summers of 1908, 1909 and 1911 as a voluntary Assistant at the Herbarium, his first articles in the series, Contributions from the Gray Herbarium of Harvard University, being published in 1910 (although, beginning in 1904, he had been publishing minor notes in RHODORA) and dealing with a genus of the *Liliaceae*, the variations of *Lycopodium complanatum* and studies of various flowering plants of Mexico. His concentration on the *Pteridophyta* had not then begun.

From this time on Weatherby continued as a part-time and largely voluntary Assistant at the Gray Herbarium, cheerfully taking on tasks needing attention or carrying on individual studies but continuing to live at East Hartford with his mother. His marriage in Boston on May 16, 1917, to Una Lenora Foster brought a great change in his life. He now had a sympathetic partner on his botanical journeys and in his studies and a skillful artist to record many details of plants upon which he was working; and when in 1929 they moved to Cambridge their home quickly became the social center for all regular workers and all visitors at the Gray Herbarium. In fact, many visiting botanists were immediately taken into the Weatherby home for their visits to Cambridge and when they were to be away on long trips, either in America or in Europe, some botanist who needed to spend the summer in Cambridge was regularly invited to occupy their house. On moving to Cambridge Weatherby became full-time Assistant in the Gray Herbarium, becoming Assistant Curator in 1931, Senior Curator in 1937; and on retiring in 1940 he was appointed Research Associate. In the latter wholly honorary capacity he worked assiduously on the ferns and on problems in nomenclature and bibliography until late in the afternoon before his death.

Throughout this long service Weatherby, like all who are really devoted to their work, watched the clock only in order to keep appointments, overlooking most holidays and almost regularly appearing at the Herbarium, to continue his studies uninter-

rupted, toward noon on all Sundays when he was in Cambridge. He was interested in all vascular plants and after he and the writer had made a close study of *Puccinellia* he had a strong leaning toward the *Gramineae* as absorbingly interesting; but, gradually becoming conscious of the vast amount of intensive study needed by the *Pteridophyta,* especially of tropical and austral America, he got more and more into those problems and would gladly have spent all his time, after his curatorial responsibilities, upon them. Unfortunately for those groups of plants, however, his deeply entrenched "New England conscience" and his always kindly temperament perpetually got in the way. He would not turn away from inquiring visitors. No question about anything within or bordering on his fields would be dismissed by him. Consequently, amateurs and professionals of all grades perpetually came to him for help and advice. Time-consuming visitors would allow themselves to occupy his time on rather trifling matters; and too often those who should, through long experience, have learned the location in the library of standard works, would calmly sit while he got the books for them! This unfailing devotion to all who asked his aid was considered by him a real duty. Some others, hearing the voice of an approaching interrupter, would quietly gather up their work and fade from sight. Not so Weatherby. He would not have approved of Thomas Nuttall's trap-door.[1]

Nevertheless, in spite of this most conscientious aiding of others, he accomplished large results and his remarkably extended bibliography (which would total many more titles if he had not so often refrained from appending his initials to memoranda and discussions which obviously came from his pen) shows a good share of outstanding technical studies, interspersed with minor notes and wonderfully illuminating reviews. Many scores of letters received from botanists all over the world by Mrs. Weatherby emphasize his remarkable capacity to accomplish large results in scientific writing, while giving liberally of himself

[1] In the fine old house in the former Harvard Botanic Garden where Nuttall had lived Mrs. Asa Gray "had retained Nuttall's trap-door. In the corner of the large living-room and study there hung a stout cord. Whenever Thomas Nuttall heard the garden-gate click or a step on the walk he pulled the rope and the trap-door in the ceiling opened nearly to the floor, with a step-ladder on its upper side. Then Nuttall disappeared and was never at home".—Fernald in Proc. Am. Phil. Soc. lxxxvi. 66 (1942).

to all who needed help. All such letters are in the same affectionate and appreciative vein and they are beautifully exemplified by a brief note to the present writer from one whose too rare visits to the Gray Herbarium have been a joy looked forward to by all the staff, the skillful and remarkably informed historian of southwestern science, Professor Samuel W. Geiser:

> I have noticed, with real sorrow, your terminal note in the July RHODORA on the death of Mr. Weatherby. He was to me on numerous occasions most kind, most helpful, most considerate; and both Dr. Shinners and I shall constantly remember him as one of the ornaments of the Gray Herbarium. Like everyone else who knew him, whether well or less intimately, we shall miss him very much. Do not think me presumptuous if I give my condolences to the Herbarium Staff members whom I am acquainted with.

Another responsibility assumed by him was his liberal aid in the preparation of the Gray Herbarium Card Index. Carried forward primarily by Miss Marjorie W. Stone, the Index constantly brought up technical problems: deciding what category was intended by authors who neglected to clarify such questions; finding the exact date of issue of obviously misdated publications; determining whether authors actually accepted combinations and names which they carelessly published; and many intricate and unforeseen dilemmas requiring technical understanding. So far did Weatherby's careful consideration of such details enter into the Index that many subscribers considered the solutions as indicating that he was the maker of the whole series of cards and that his decisions could not be challenged. His keenness in such matters led to his election to the British Society for the Bibliography of Natural History.

As an adjunct to his studies in Cambridge Weatherby's several visits to the European herbaria were important. On these trips he was regularly accompanied by Mrs. Weatherby. While he made critical examination of types in the groups on which he was working she supplemented his notes by photographs or drawings. Similarly, they made photographs and notes on the types of Stephen Elliott so far as they are preserved at the Charleston Museum.

Quite outside the special work of or associated with the Gray Herbarium his constant activity and resourcefulness were apparent. One of the original members of the Connecticut Botanical

Society and its Vice-President for nearly twenty years, he rarely, if ever, missed one of its annual meetings. His work on the great Catalogue has already been noted. An early member of the American Fern Society, which he joined in 1912, he began publishing in its Journal in 1913 and from then until his death most numbers contained his illuminating articles, technical notes, reviews and editorial items. He was inclined to take no credit for the brief notes and reviews, sometimes signing them, often not; but, even so, his finished style, references to earlier signed reviews or other clues often identify the author, for even in severe criticism of work which was superficial, hasty or ill-advised his whimsical humor would appear. Thus, in his detailed analysis of Dickason's *Phylogenetic Study of the Ferns of Burma* and that author's unsuccessful attempts to account for many lines of descent (or ascent), the reviewer tucked in the footnote: "Taken by and large, the critics of Darwin seem to have worked themselves into the position of maintaining that he was wrong in just about everything except his main conclusion. It might not be amiss to remember, now and then, that one of the salient features of Darwinian theory is its innate reasonableness". Am. Fern Journ. xxxvii. 28 (1947). Continuing the discussion, Weatherby wrote on the next page: "Incidentally, in making up his series, Dickason has accepted 32 out of 33 of Ching's families segregated from Polypodiaceae. But, though he reproaches Ching for inadequate discussion, he can find no better reason for this acceptance than Ching's own—'that it is in harmony with the present tendency'. One can say as much for women's hats." Then follows: "After such discussion, one feels a sort of yearning for the simplicity and neatness of soral development in Diels's treatment of the Polypodiaceae." Then, after discussion of theories of soral development and change, he concluded his brilliant and really important discussion: "Any phylogenist will tell you this is too good to be true; and probably he is right; nature is not so simple. But not every day does one find a fairy-tale which fits so nicely with observed facts."

This insistence on recognition of the soundness (until proved unsound) of the work of Diels and other cautious and closely reasoning students of the ferns and the unsoundness of the work of Ching and his followers was again made apparent in a late

review published by Weatherby in the Fern Journal (xxxix. 59–61). There discussing the rather hasty and often inaccurate *Phylogeny and Ontogeny of the Pteropsida. I. Schizaeales* by Dr. Clyde F. Reed, Weatherby opened with a footnote: "One might take exception to certain slips in Latin, which, though pardonable in these days of non-classical education, could have been reduced in number by a little more attention to a grammar, a lexicon, and to the good models provided by Prantl." Then, after some analysis of the work he concludes:

> Dr. Reed seems to have taken Ching as a model. Like Ching, he fails to give any direct or adequate answer to the query which at once arises: why and how does phylogeny require the erection of genera into families and the more or less jacking up in rank of previously recognized groups? This is an unfortunate lack, for it generates in skeptical minds the suspicion that phylogeny is, in these cases, only camouflage for plain, old-fashioned splitting. Whether or not this suspicion is justifiable, there is no doubt that, in such work as the present, taxonomy (properly, the construction of cross-sections of lines of descent) and phylogeny (properly, the conjectural following back of these lines into the geologic past) tend to become synonymous. In spite of their interlocking nature they are not the same thing. When this is recognized and really interpretative discussion provided, work like Dr. Reed's, which undoubtedly represents a strong present trend in classification, will become more convincing.

Such reviews, like those of Small's *Manual* and others in which conservatism is thrown to the wind, should not remain partly hidden in the specialized journals in which they appeared. Their reading and careful consideration by students in those biological fields where it is the ignorant custom to "knock" taxonomy as "mere collecting of postage stamps" would, if that is possible, bring a ray of illumination to their too often cloistered outlooks.

Returning more directly to the American Fern Society, it should be noted that in 1915 Weatherby joined the board of Editors of the American Fern Journal, continuing as an Editor to 1940, and in 1943 and 1944 he was President of the Society. His services to the Society were unlimited and when he resigned in 1940 as an Editor his coworker through many years, Dr. Ralph C. Benedict, closing a highly appreciative account of Weatherby's work for the Society, wrote (Am. Fern Journ. xxxi. 3):

> New Englanders are notably reticent, not given to volubility in the expression of personal views and philosophy. However, it is possible at times to discover a man's aims and point of view indirectly, by noting how

he appraises others and what he admires in them. Read Mr. Weatherby's tribute to C. H. Bissell, in Volume 15 of the JOURNAL. From that I quote, with a minor modification, a sentence which most appropriately characterizes Charles Alfred Weatherby today: "A man to whom his fellow members turn with entire confidence in any matter which calls for perfect integrity, sound judgement, and constructive ability."

Similarly, the New England Botanical Club owes much to him. A member since 1906, he was Librarian from 1928 and in 1929 he became one of the Associate Editors of RHODORA. With his critical aid essentially all (except those of the late Alexander W. Evans and a few others who wrote unexcelled English) manuscripts and proof-sheets of RHODORA were scrupulously read, up to some papers still unpublished; and many authors accepted without demur the introduction of hyphens or semicolons and corrections of English and Latin, matters in which, without his watchful eye, future numbers of the journal may become delinquent. In 1945 he served as President of the American Society of Plant Taxonomists and from 1943 was an Editor of Brittonia. Much of his time was taken up in the preparation of the unofficial special edition of the International Rules of Botanical Nomenclature (with Camp and Rickett) published in Brittonia in 1947. Much more went into the canvass of American botanists and the preparation (as a member of the Central Committee on Nomenclature of the American Society of Plant Taxonomists) of the Proposed Changes in the International Rules of Botanical Nomenclature, published in Brittonia for June, 1949.

He had taken his turn as a Councillor of the American Academy of Arts and Sciences, as an Editor of the American Journal of Botany, as Chairman of the Committee on Nomenclature of the Botanical Society of America; and doubtless in many other helpful capacities which his modesty prevented his noting in his statements in the usually available sources of such information. The recognition of his keen understanding of problems in nomenclature which most pleased him and which loaded him with a full quota of laborious study, was his appointment at the International Botanical Congress at Amsterdam in 1935 as one of the two[1] American members of the International Committee on Nomenclature of Vascular Plants, an appointment which he, like his coworker, Rehder, took as meaning real study. His last

[1] ALFRED REHDER, the second member, died one month after Weatherby, on July 21, 1949.

hours at the Gray Herbarium were spent on work of this Committee. Only a few days earlier he had been greatly pleased by his appointment as Vice-President of the Section on Nomenclature of the International Botanical Congress to be held in Stockholm in the summer of 1950, and he and Mrs. Weatherby were arranging for their passage to Stockholm. Most unfortunately, the Section on Nomenclature will be without his cautious and wise counsel.

As if all these activities were not enough to satisfy the intellectual appetite of anyone, Weatherby kept up a keen interest in and appreciation of music and art and, for good measure, spent many evenings with his volumes on military history and strategy. Mrs. Weatherby tells of his reading the details of manoeuvers in Europe during the second world-war and suddenly exclaiming: "There, you see, they have done what I said they should do"—this from one of the most peaceful and peaceable men who ever lived.

Those who have best known him have long recognized the rare qualities of Alfred Weatherby: his patience and unselfish devotion to what he conceived as his duty; his loyalty to friends, even though he strongly differed with them; his capacity for close and accurate study under handicaps which would discourage others; his cheerfulness in the face of obstacles and his readiness to set aside his own interests in order to help those who asked his assistance. These are superlative virtues and not often met. It is doubtful if in these days such a botanist and helper of botanists can be found to take his place.

Gray Herbarium.

BIBLIOGRAPHY OF CHARLES ALFRED WEATHERBY

Compiled by M. L. Fernald and Bernice G. Schubert

[Omitting official Notices and unsigned Memoranda; also unsigned Reviews in the American Fern Journal, many of them with important criticisms and expressions of personal judgment. Also omitting two studies in literary fields, published in his senior year in college in the Harvard Monthly, xxiv. 173–184 and 207–209 (1897) and a third in vol. xxviii. 64–74 (1899).]

1904

1. Panicum Commonsianum in Connecticut. Rhodora, vi. 42, 43.

1906

2. An Extreme Form of Botrychium Virginianum. Ibid. viii. 47, 48.

1909

3. A Color Form of Potentilla pumila. Ibid. xi. 152, 153.

1910

4. [With Charles Burr Graves and others.] Catalogue of the Flowering Plants and Ferns of Connecticut growing without cultivation. Bull. no. 14, Conn. Geol. and Nat. Hist. Survey. 569 pp.
5. A preliminary Synopsis of the Genus Echeandia. Proc. Am. Acad. xlv. 387–394 (Contrib. Gray Herb. n. s. xxxviii, pt. i).
6. American Forms of Lycopodium complanatum. Ibid. 412–415 (Contrib. Gray Herb. n. s. xxxviii, pt. iii).
7. Mexican Phanerogams—Notes and new Species. Ibid. 422–428 (Contrib. Gray Herb. n. s. xxxviii, pt. v).

1913

8. Wayside Ferns of the Dolomites. Am. Fern Journ. iii. 4–9.
9. Some new Combinations required by the International Rules. Proc. Am. Acad. xlix. 492 (Contrib. Gray Herb. n. s. xlii, pt. iii).

1914

10. Old-time Connecticut Botanists and their Herbaria,—I. Rhodora, xvi. 83–90.

1915

11. [With May Coley.] Wild Flower Preservation. 197 pp., xxviii plates. Feb. 1915. New York. F. A. Stokes Co.
12. The Philadelphia Meeting [of the American Fern Society]. Am. Fern Journ. v. 18–21, 1 fig. (members).
13. Report of Secretary [of American Fern Society] for 1914. Ibid. 25, 26.
14. Two Extensions of Range in Gramineae. Rhodora, xvii. 71.
15. Where Ophioglossum grows. Am. Fern Journ. v. 43, 44.

1916

16. [With M. L. Fernald.] The Genus Puccinellia in eastern North America. Rhodora, xviii. 1–23, plates 114–117 (Contrib. Gray Herb. n. s. xlvi).
17. Staminody of the Petals in Amelanchier. Ibid. 48, 49.
18. Report of the Secretary [of the American Fern Society] for 1915. Am. Fern Journ. vi. 24, 25.
19. [With R. C. Benedict and E. J. Winslow.] Report of the Editors [of the Am. Fern Journ.] for 1915. Ibid. 29, 30.
20. Some western Species of Puccinellia. Rhodora, xviii. 181–183.
21. [With S. F. Blake.] Galium pilosum and its Varieties. Ibid. 190–195.
22. Answers [regarding the name Phegopteris hexagonoptera]. Am. Fern Journ. vi. 92.

23. Note [without title] on the two rarest Ferns of New England. Ibid. 93.
24. Concerning Linum intercursum Bicknell. Rhodora, xviii. 224.

1917

25. The Brooklyn Meeting [of the American Fern Society]. Am. Fern Journ. vii. 19–21.
26. Report of the Secretary [of the American Fern Society] for 1916. Ibid. 24, 25.
27. [With R. C. Benedict and E. J. Winslow.] Report of the Editors [of Am. Fern Journ.] for 1916. Ibid. 28, 29.
28. [With E. B. Harger and others.] Additions to the Flora of Connecticut. Rhodora, xix. 105–110, 119–130, 224–232, 245–253.
29. Color Forms of Impatiens biflora. Ibid. 115–118.
30. Concerning Polystichum acrostichoides, forma lanceolatum. Am. Fern Journ. vii. 90, 91, fig.

1918

31. Note [without title] on Preparation of Specimens. Ibid. viii. 21, 22.
32. [Review.] *Notes Ptéridologiques* by Le Prince Roland Bonaparte. Ibid. 22, 23.
33. [Review.] *Notes sur les Fougères* by Gadeau de Kerville. Ibid. 23, 24.
34. Report of the Secretary [of the American Fern Society] for 1917. Ibid. 25, 26.
35. [With R. C. Benedict and E. J. Winslow.] Report of the Editors [of Am. Fern Journ.] for 1917. Ibid. 28, 29.
36. [Review—under Some Recent Fern Literature.] Studies by Butters, Farwell, McCaughey, Maxon and Steil. Ibid. 53–59.
37. [Comment without title.] On Colloquial Names. Ibid. 62, 63.
38. [With C. H. Knowlton and W. S. Ripley, Jr.] Report of Committee on Floral Areas [of New England]. Rhodora, xx. 181–185, 193–197.

1919

39. Pellaea microphylla Mett. ex Kuhn. Am. Fern Journ. viii. 104–108, plate 5.
40. [Notes and News, without specific title.] Reviews of or comments on publications by Van Eseltine, Small, Maxon, Berry, E. W. Brown and W. N. Steil. Ibid. ix. 23–27.
41. Report of the Secretary [of the American Fern Society] for 1918. Ibid. 29, 30.
42. [With R. C. Benedict and E. J. Winslow.] Report of the Editors [of Am. Fern Journ.] for 1918. Ibid. 30, 31.
43. Long Pond. Rhodora, xxi. 73–76.
44. Further Notes on Impatiens biflora. Ibid. 98–100, figs.
45. An Omission in the preliminary List of New England Ranunculaceae. Ibid. 104.
46. Changes in the Nomenclature of the Gray's Manual Ferns. Ibid. 173–179.

1920

47. A Neglected Character in the Beech-ferns. Am. Fern Journ. ix. 121, 122, fig.
48. Records of monomorphic Equisetum Telmateia. Ibid. 122, 123.

49. Habenaria psycodes, var. ecalcarata in Vermont. Rhodora, xxii. 31, 32.
50. [With R. C. Benedict and E. J. Winslow.] Report of the Editors [of Am. Fern Journ.] for 1919. Am. Fern Journ. x. 31, 32.
51. [With C. H. Knowlton and W. S. Ripley, Jr.] Second Report of the Committee on Floral Areas. Rhodora, xxii. 80–89.
52. More interesting fern localities. Am. Fern Journ. x. 57–59 [unsigned].
53. Varieties of Pityrogramma triangularis. Rhodora, xxii. 113–120.
54. [Review—under Recent Fern Literature.] Work by Graff. Am. Fern Journ. x. 89.
55. A European Primrose in New England. Rhodora, xxii. 143.

1921

56. What the Latin names mean. Am. Fern Journ. x. 113–115.
57. [Review—under Recent Fern Literature.] Works by Holm and by Small. Ibid. 121–123.
58. [With M. L. Fernald.] Equisetum fluviatile or E. limosum? Rhodora, xxiii. 43–47.
59. A Form of Ilex opaca. Ibid. 118, 119.
60. Old-time Connecticut Botanists and their Herbaria,—II. Ibid. 121–125, 171–177.
61. Other Records of Salvinia natans in the United States. Am. Fern Journ. xi. 50–53.
62. [With R. C. Benedict and E. J. Winslow.] Report of the Editors [of Am. Fern Journ.] for 1920. Ibid. 62.

1922

63. [With C. H. Knowlton and W. S. Ripley, Jr.] Third Report of the Committee on Floral Areas. Rhodora, xxiii. 209–220.
64. The Climbing Fern in the Vicinity of Hartford. Am. Fern Journ. xi. 109–113, plate 2.
65. A Correction [with publication of Polypodium vulgare, f. brachypteron Ridlon]. Ibid. 122.
66. Barratt, Torrey and Schweinitz: a Correction. Rhodora, xxiii. 300, 301.
67. A New Species of Eleocharis from Massachusetts. Ibid. xxiv. 23–26.
68. Some Amateur Observations on Color-forms. Torreya, xxii. 37–42.
69. [With M. L. Fernald.] Varieties of Geum canadense. Rhodora, xxiv. 47–50.
70. Is Botrychium dissectum a Sterile Mutant? Am. Fern Journ. xii. 9–12.
71. On a Supposed Hybrid in Equisetum. Ibid. 12–16.
72. [With R. C. Benedict and E. J. Winslow.] Report of the Editors [of Am. Fern Journ.] for 1921. Ibid. 28, 29.
73. [With E. B. Harger and others.] Additions to the Flora of Connecticut. Series 2. Rhodora, xxiv. 111–121.
74. The Group of *Polypodium lanceolatum* in North America. Contrib. Gray Herb. n. s. lxv., pt. i. 3–14.

1923

75. Some Critical Plants of Atlantic North America. Rhodora, xxv. 17–23.

76. [With R. C. Benedict and E. J. Winslow.] Report of the Editors [of Am. Fern Journ.] for 1922. Am. Fern Journ. xiii. 29, 30.
77. The Identity of Carex gynandra Schwein. Rhodora, xxv. 115, 116.
78. A Mysterious Reprint of no. 1 of the Fern Bulletin. Am. Fern Journ. xiii. 97, 98.

1924

79. An Interesting Relic and its Owner [with note on August Fendler]. Ibid. 114–118.
80. [Review—under Recent Fern Literature.] Marie-Victorin's *Les filicinées du Quebec*. Ibid. 118–120.
81. Two more Wool-waste Plants from Westford, Mass. Rhodora, xxvi. 38, 39.
82. Another Davenport Fern Herbarium. Ibid. 49–55.
83. [Review.] Standardized Plant Names. Am. Fern Journ. xiv. 19, 20.
84. Osmunda Claytoniana, forma dubia. Ibid. 21.
85. [With R. C. Benedict and E. J. Winslow.] Report of the Editors [of Am. Fern Journ.] for 1923. Ibid. 30, 31.
86. A New Satureja from Florida. Rhodora, xxvi. 80, 81.
87. Note on the Forms of Polypodium virginianum. Am. Fern Journ. xiv. 60, 61.
88. A Note on Stellaria pubera Michx. Rhodora, xxvi. 169–171.
89. The Herbarium of George E. Davenport. Am. Fern Journ. xiv. 94, 95.
90. The Earliest Record of Proliferous Ebony Spleenwort. Ibid. 95, 96.

1925

91. Note [without title] on occurrence of Rusts on Ferns. Ibid. 123, 124.
92. Gaura parviflora Dougl., var. lachnocarpa. Rhodora, xxvii. 14, 15.
93. [With C. H. Knowlton and W. S. Ripley.] Fourth Report of the Committee on Floral Areas. Ibid. 56–65.
94. [Discussion—under Recent Fern Literature.] Papers by Stokey and Starr and by Degener on Prothallia of Lycopodium. Am. Fern Journ. xv. 19–21.
95. [With R. C. Benedict and E. J. Winslow.] Report of the Editors [of Am. Fern Journ.] for 1924. Ibid. 31, 32.
96. Inconstancy in Color-forms of Hepatica americana. Rhodora, xxvii. 131, 132.

1926

97. Charles Humphrey Bissell. Am. Fern Journ. xv. 101–106 (portrait).
98. Lygodium palmatum in Berkshire County, Mass. Ibid. xvi. 26, 27.
99. A new Magnolia from West Florida. Rhodora, xxviii. 35, 36.
100. [With C. H. Knowlton and R. C. Bean.] Fifth Report of the Committee on Floral Areas. Ibid. 43–46.
101. Note [without title, except on cover] on Forked and Crested Forms of Ferns. Am. Fern Journ. xvi. 60.
102. [With R. C. Benedict and E. J. Winslow.] Report of the Editors [of Am. Fern Journ.] for 1925. Ibid. 68, 69.
103. A new North American Variety of Cystopteris fragilis. Rhodora, xxviii. 129–131.
104. On Solidago rigida L., and the Application of old Botanical Names. Ibid. 138–145.

1927

105. Equisetum pratense in Berkshire County, Mass. Ibid. xxix. 32.
106. Imperfectly circinate Vernation in Ferns. Am. Fern Journ. xvi. 109–111, figs.
107. [A detailed Review—under Recent Fern Literature.] Chrysler's study of Abnormalities in Botrychium and certain other Ferns. Ibid. 120–123.
108. Comment [without title] on Abnormal Forms of *Botrychium*. Ibid. 127, 128.
109. [With R. C. Benedict and E. J. Winslow.] Report of the Editors [of Am. Fern Journ.] for 1926. Ibid. xvii. 71, 72.
110. A New Polypodium from Mexico. Ibid. 91–94, plate 5.
111. The Group of Acalypha virginica in Eastern North America. Rhodora, xxix. 193–204.
112. Tetramerism in Trillium undulatum. Ibid. 223.
113. A Teratological Form of Vaccinium pennsylvanicum. Ibid. 237, 238.
114. [Review.] Blewitt's Flora of Waterbury, Connecticut. Ibid. 240.

1928

115. [With C. H. Knowlton and R. C. Bean.] Sixth Report of the Committee on Floral Areas. Ibid. 247–253.
116. [Notice.] "Additions to the Flora of Worcester County, Massachusetts". Ibid. xxx. 20.
117. Imperfectly Circinate Vernation in Ferns. Am. Fern Journ. xviii. 31, 32.
118. [With R. C. Benedict and E. J. Winslow.] Report of the Editors [of Am. Fern Journ.] for 1927. Ibid. 34, 35.
119. William Stout, a Forgotten Student of Ferns. Ibid. xviii. 37–45 (portrait).
120. A new Species of Juncus from Colombia. Contrib. Gray Herb. lxxxi. 84.
121. A Note on the Genus Paspalum in New England. Rhodora, xxx. 133–135.
122. A Variety of Hypericum canadense. Ibid. 188–190, 2 figs.
123. Discussion [without title] of a series of Questions. Am. Fern Journ. xviii. 129, 130.

1929

124. [With M. L. Fernald.] Schmidel's Publication of Thelypteris. Rhodora, xxxi. 21–26, plate 179 (Contrib. Gray Herb. lxxxiii, pt. i).
125. [With R. C. Benedict and E. J. Winslow.] Report of the Editors [of Am. Fern Journ.] for 1928. Am. Fern Journ. xix. 68–70.
126. [With M. L. Fernald.] Proposed Amendments to the International Rules of Botanical Nomenclature. Rhodora, xxxi. 91–96.
127. [With C. H. Knowlton and R. C. Bean.] Seventh Report of the Committee on Floral Areas. Ibid. 106–118.
128. Two Variants of Ranunculus recurvatus. Ibid. 163, 164.
129. Seed versus Sorus. Am. Fern Journ. xix. 102–104.

1930

130. [Discussion—under Recent Fern Literature.] Work by Copeland, Christensen, Fernald, Weatherby, W. A. Anderson and Friesner. Ibid. xx. 25–30.

131. [With R. C. Benedict and E. J. Winslow.] Report of the Editors [of Am. Fern Journ.] for 1929. Ibid. 34–36.
132. [Review.] Deam's Grasses of Indiana. Rhodora, xxxii. 117, 118.
133. Distinguishing Woodsia and Cystopteris. Am. Fern Journ. xx. 85, 86.
134. [Review or Comments—under Recent Fern Literature.] On work of Bush, Clute and Mrs. Josephine F. Clark. Ibid. 120–123.

1931

135. [With E. B. Harger and others.] Additions to the Flora of Connecticut (first Supplement to Bull. no. 14). Bull. no. 48, Conn. Geol. and Nat. Hist. Survey. 94 pp.
136. An island variety of Cheilanthes peninsularis. Am. Fern Journ. xxi. 25, 26.
137. [With R. C. Benedict and E. J. Winslow.] Report of the Editors [of Am. Fern Journ.] for 1930. Ibid. 78, 79.
138. New American Species of Trichomanes. Contrib. Gray Herb. xcv, pt. iii, 36–40, plate viii.
139. The Group of Asplenium fragile in South America. Ibid. pt. v, 49–52.
140. [With M. L. Fernald.] Some new Plants from the Gaspé Peninsula. Rhodora, xxxiii. 231–240, 1 fig.
141. [Review.] Hitchcock's "Field Work for the Local Botanist". Ibid. 244, 245.

1932

142. [With W. R. Maxon.] Two new tropical Species of Adiantum. Am. Journ. Bot. xix. 165–167.
143. On the Nomenclature of Elodea. Rhodora, xxxiv. 114–116.
144. A Curious Phenomenon in the Christmas Fern. Am. Fern Journ. xxii. 55, 56, fig.
145. Note [without title]. On Florist's Use of *Polystichum munitum.* Ibid. 60.
146. Anacharis densa on Long Island. Rhodora, xxxiv. 151, 152.
147. [With M. L. Fernald.] Bartonia; a Comedy of Errors. Ibid. 164–167.
148. [With M. L. Fernald.] Pinus Strobus L., forma prostrata (Mast.) comb. nov. Ibid. 168.
149. [With M. L. Fernald.] Picea glauca, forma parva. Ibid. 187–189.
150. [With M. L. Fernald.] Abies balsamea (L.) Mill., forma hudsonia (Bosc) comb. nov. Ibid. 190, 191.
151. [With M. L. Fernald.] Picea rubens Sarg., forma virgata (Rehder), comb. nov. Ibid. 211.
152. [Discussion—under Recent Fern Literature.] Studies by Marie-Victorin in *Lycopodium* and *Botrychium.* Am. Fern Journ. xxii. 95–97.
153. Note [without title]. On color of the American Royal Fern. Ibid. 101.
154. An Addition to the Wool-waste Flora of eastern Massachusetts. Rhodora, xxxiv. 214, 215.

1933

155. Panicum dichotomiflorum, var. puritanorum in New Hampshire. Ibid. xxxv. 68.
156. Walter Deane. Ibid. 69–80 (portrait).
157. Aristida longespica in Connecticut. Ibid. 386.

1934

158. [With Ludlow Griscom.] Notes on the Spring Flora of the Coastal Plain of South Carolina north of Georgetown. Ibid. xxxvi. 28–55.
159. Epifagus virginiana (L.) Bart., forma pallida, n. f. Ibid. 59.
160. [Discussion—under Recent Fern Literature.] Papers on Ferns and Fern Allies of Missouri by Palmer and Steyermark and by M.E. Pinkerton. Am. Fern Journ. xxiv. 18–21.
161. Ferns in Bottles. Summary of paper by Charles E. Benham. Ibid. 27, 28.
162. [Review.] Small's Manual of the Southeastern Flora. Rhodora, xxxvi. 235–237.
163. [With R. A. Ware and F. W. Hunnewell.] Report of Committee on Revision and Investigation, American Fern Society. Am. Fern Journ. xxiv. 60.
164. [With M. L. Fernald.] Some Inadequately Characterized Species of George Vasey. Rhodora, xxxvi. 346–348.

1935

165. [Review.] The Flora of the Niagara Frontier. Ibid. xxxvii. 163, 164.
166. A List of Varieties and Forms of the Ferns of Eastern North America. Am. Fern Journ. xxv. 45–51, 95–100.
167. On Certain Mexican and Central American Ferns. Ibid. 52–59, plate 4.
168. Conservation of later generic Homonyms; Letter **C**. Bull. Misc. Information, Roy. Bot. Gard. Kew. Nos. 6–9 for 1935. 398–422.
169. A new Variety of Cystopteris fragilis and some old Ones. Rhodora, xxxvii. 373–378, plate 383.
170. Collinsia parviflora in New England. Ibid. 422.

1936

171. [Review.] Rogers's "Tree Flowers of Forest, Park, and Street". Ibid. xxxviii. 74, 75.
172. A List of Varieties and Forms of the Ferns of Eastern North America. Am. Fern Journ. xxvi. 11–16, 60–69 and plate 6, 94–99, 130–136. [Continued from vol. xxv.]
173. John Isaac Briquet (1870–1931). Proc. Am. Acad. lxx. 503, 504.
174. Carl Hansen Ostenfeld (1873–1931). Ibid. 565, 566.
175. Ignatz Urban (1848–1931). Ibid. 587, 588.
176. Richard Wettstein (1863–1931). Ibid. 599.
177. [Review.] Small's "Ferns of the Vicinity of New York". Rhodora, xxxviii. 163, 164.
178. A further note on Solidago rigida L. Ibid. 195, 196.
179. Nomenclature of Virginia Ferns. Claytonia, ii. 41–45.
180. [With C. H. Knowlton and R. C. Bean.] Eighth Report of the Committee on Plant Distribution. Rhodora, xxxviii. 263–271.
181. Edward Willis Graves. Am. Fern Journ. xxvi. 75, 76.

182. [Review.] Life and Work of Cyrus Guernsey Pringle. Science, n. s. lxxxiv. 137, 138 (Aug. 7).
183. On the Types of Desvaux's American Species of Ferns. Contrib. Gray Herb. cxiv, pt. iv. 13–35.
184. A new Mexican Carex. Ibid. pt. v. 36, 37.
185. [Notice.] Wiley's "Ferns of Northeastern United States". Rhodora, xxxviii. 345.
186. [Notice.] A Memorial Volume to Cyrus Guernsey Pringle. Ibid. 455.

1937

187. The Typification of Acalypha virginica L. Ibid. xxxix. 14–16.
188. A List of Varieties and Forms of the Ferns of Eastern North America. Am. Fern Journ. xxvii. 20–24, 51–56. [Continued from vol. xxvi.]
189. A further Note on "Polypodium Filix-fragile". Ibid. 27, 28.
190. Note on Tryon's Ferns of the Dune Region of Indiana. Ibid. 64, 65.
191. Note on Massey's *Shield Ferns of Virginia.* Ibid. 65.
192. The Effect of Light on the Fruiting of the Christmas Fern. Ibid. 66, 67.
193. The Identity of Meniscium oligophyllum. Ibid. 68.
194. A Further Note on Salvinia. Ibid. 98–102.
195. [With K. M. Wiegand.] The Nomenclature of the Verticillate Eupatoria. Rhodora, xxxix. 297–306, plates 466–468 (Contrib. Gray Herb. cxviii, pt. ii).

1938

196. The Identity of Woodwardia thelypterioides Pursh. Am. Fern Journ. xxviii. 35.
197. Report of informal Meeting of the American Fern Society at Indianapolis. Ibid. 38, 39.
198. [Review.] Wherry's Guide to the Ferns of the Central Atlantic States. Rhodora, xl. 247, 248.
199. [Notes—under Recent Fern Literature.] On Kalliola's study of *Dryopteris fragrans* and on Clute's *Our Ferns, their Haunts, Habits and Folklore.* Am. Fern Journ. xxviii. 66–69.
200. [Review—under Recent Fern Literature.] Clausen's *Monograph of the Ophioglossaceae.* Ibid. 116–118.
201. [Review—under Recent Fern Literature.] Verdoorn's *Manual of Pteridology.* Ibid. 118–120.
202. Foreword, pp. 3 and 4, to Maurice Broun's *Index to North American Ferns.*

1939

203. [With S. F. Blake.] On certain Plant Records from Hillsboro, New Hampshire. Rhodora, xli. 34–36.
204. On certain Type Specimens in Ferns. Contrib. Gray Herb. cxxiv, pt. v. 13–22.
205. The Group of Polypodium polypodioides. Ibid. pt. vi. 22–35.
206. Compound Words in present-day English. Science, n. s. lxxxix. 413 (May 5).
207. Certain Plant Records from Hillsboro, New Hampshire; a Correction. Rhodora, xli. 138, 139.
208. Two new Combinations in Stewartia. Ibid. 198.

209. [With W. R. Maxon.] Some Species of Notholaena, New and Old. Contrib. Gray Herb. cxxvii, pt. i. 3–17, 1 fig.

1940

210. [Review—under Recent Fern Literature.] Discussion of works by Slater, Kemp and Ching. Am. Fern Journ. xxix. 149–152.
211. Rafinesque's Types in the Group of Acalypha virginica. Rhodora, xlii. 96.
212. [Review.] Grasses and Sedges of Woodstock, Vernont. Ibid. 143, 144.
213. A Peloric Flower in Gerardia tenuifolia. Ibid. 416, 417.
214. Editorial note [without title] on the publication of a paper by Tryon. Am. Fern Journ. xxx. 104.

1941

215. Lachnanthes in Nova Scotia. Rhodora, xliii. 36.
216. [Review.] Deam's Flora of Indiana. Ibid. 75, 76.
217. [Review—under Recent Fern Literature.] *Ferns and Fern Allies of Wisconsin.* Am. Fern Journ. xxxi. 24, 25.
218. [Review.] Hashimoto's *Flora Nippo-Brasiliensis,* I. Ibid. 28, 29.
219. Editorial Report, 1915–1940. Ibid. 35, 36.
220. Gnaphalium obtusifolium, var. micradenium in New Hampshire and South Carolina. Rhodora, xliii. 211.
221. Lawson's Type Specimens. Am. Fern Journ. xxxi. 59–62.
222. Protective Fern Mounts. Ibid. 114.
223. [Note—under Recent Literature.] On an "unsigned" article in *Horticulture.* Ibid. 115.
224. [Note—under Recent Literature.] On recent papers by Looser. Ibid. 115, 116.
225. [Note—under Recent Literature.] On Chandler's *The common Missouri Ferns.* Ibid. 118.
226. The Argentine Species of "Notholaena". Lilloa, vi. 251–275, plates I–IV, map, figs.
227. [Review—under Recent Fern Literature.] Nessel's Die Bärlappgewächse (Lycopodiaceae). Am. Fern Journ. xxxi. 148, 149.
228. [Note—under Recent Fern Literature.] On work of Mathias González et al. Ibid. 149, 150.
229. [Review—under Recent Fern Literature.] Ching's *A new Fern Family in tropical Asia.* Ibid. 150–151.
230. [Comment—under Recent Fern Literature.] On *Weeds and Weed Seeds.* Ibid. 151.

1942

231. Proliferous Scott's Spleenwort. Ibid. xxxii. 23–25, fig.
232. [Note—under Recent Fern Literature.] On Wright and Crandall's *Rhode Island Ferns.* Ibid. 29.
233. Subspecies. Rhodora, xliv. 157–167.
234. Two Weeks in Southwestern Nova Scotia. Ibid. 229–236.
235. Fée Isotypes at Colorado College. Am. Fern Journ. xxxii. 68, 69.
236. Frederick Gillan Floyd. Ibid. 79, 80.
237. A List of Type Specimens in Elliott's Herbarium. Rhodora, xliv. 249–262 (Contrib. Gray Herb. cxli).
238. Apocynum sibiricum var. cordigerum in New England. Ibid. 331, 332.

239. [Review—under Recent Fern Literature.] Tryon's *Revision of the Genus Pteridium.* Am. Fern Journ. xxxii. 113–115.
240. [Review—under Recent Fern Literature.] Work of Hermano Daniel. Ibid. 116, 117.

1943

241. The Range of Notholaena delicatula. Ibid. xxxiii. 27, 28.
242. [Review—under Recent Fern Literature.] Ching's *The Studies of Chinese Ferns—xxxi.* Ibid. 31–33.
243. [Review—under Recent Fern Literature.] Shaver's *Some general Notes on Ferns.* Ibid. 34.
244. The Type Species of Cheilanthes. Ibid. 67–69.
245. [Notes—under Recent Fern Literature.] On studies of *Notholaena* and *Pellaea* by Looser. Ibid. 78, 79.
246. [Review.] A Check-list of Kentucky Plants. Rhodora, xlv. 278.
247. Valid and Legitimate Names—and Thalictrum polycarpum S. Wats. Madroño, vii. 83–85.
248. Polypodiaceae, Schizaeaceae, Marsiliaceae, Psilotaceae, Equisetaceae and Selaginellaceae in I. M. Johnston, Plants of Coahuila, eastern Chihuahua and adjoining Zacatecas and Durango. Journ. Arn. Arb. xxiv. 308–329.
249. An unusual Habitat for Cuscuta compacta. Rhodora, xlv. 416.
250. The Group of Selaginella Parishii. Am. Fern Journ. xxxiii. 113–119.

1944

251. A Southern Variety of Polypodium peltatum. Ibid. xxxiv. 17–19.
252. [Review—under Recent Fern Literature.] On edible Ferns in Fernald and Kinsey's *Edible Wild Plants of Eastern North America* and in Merrill's *Emergency Food Plants and Poisonous Plants of the Islands of the Pacific.* Ibid. 28, 29.
253. Report of the President [of the American Fern Society] for 1943. Ibid. 30–32.
254. "Horse serum" a compound Word. Science, xcix. 365 (May 5).
255. [With Marjorie W. Stone.] A Plea for the Elimination of unnecessary Nomenclatural Changes. Rhodora, xlvi. 201–204.
256. [Review.] Four studies by Looser. Am. Fern Journ. xxxiv. 63.
257. [Notes—under Recent Fern Literature.] On Rugg's transplant-experiments with Osmunda. Ibid. 97, 98.
258. The group of Selaginella oregana in North America. Journ. Arn. Arb. xxv. 407–419, plates 1 and 2.

1945

259. Vegetative Reproduction in Carex tribuloides and C. projecta. Rhodora, xlvii. 39, 40.
260. Alfred Barton Rendle (1865–1938). Proc. Am. Acad. lxxv. 173–174.
261. Linum catharticum in New Brunswick. Rhodora, xlvii. 68.
262. Report of the President [of the American Fern Society] for 1944. Am. Fern Journ. xxxv. 27, 28.
263. Utricularia inflata var. minor in Canada. Rhodora, xlvii. 235.
264. The Earliest Collection of Onocleopsis. Am. Fern Journ. xxxv. 52, 53.
265. Further Suggestions for the Utilization of Bracken in Great Britain. Ibid. 56.

266. [Review—under Recent Fern Literature.] Lichtenstein's *Ofioglosaceas de la Argentina.* Ibid. 58, 59.
267. [Review.] Bingham's Flora of Oakland County, Michigan. Rhodora, xlvii. 260.
268. Northwestern Limits of Cystopteris fragilis var. laurentiana. Am. Fern Journ. xxxv. 93.
269. [With John Adams.] A List of the Vascular Plants of Grand Manan, Charlotte County, New Brunswick. Contrib. Gray Herb. clviii, 96 pp., 1 plate (map).
270. [Review—under Recent Fern Literature.] Henry N. Andrews on Ancestry of *Anemia.* Am. Fern Journ. xxxv. 129.
271. [Review—under Recent Fern Literature.] Looser's *Sinopsis de los "Asplenium" (Filices) de Chile.* Ibid. 129, 130.

1946

272. A New Argentine Variety in Notholaena. Ibid. xxxvi. 7–9, map.
273. Changes in Botanical Names. Am. Midl. Nat. xxxv. 795, 796.
274. A New Selaginella from Western Texas. Am. Fern Journ. xxxvi. 51–53, figs.
275. [Review—under Recent Fern Literature.] Looser's *El genero Notholaena en Chile,* and his *Sobre la pteridofita Argentino-Chileana "Lycopodium confertum".* Ibid. 60–62.
276. A Variety of Athyrium decurtatum from Argentina. Ibid. 94, 95.
277. "Notholaena" in Brazil. Journ. Arn. Arb. xxvii. 361–370, plates I and II.
278. Bracken in the Bombed Areas of London. Am. Fern Journ. xxxvi. 122, 123.
279. Impatiens Roylei versus I. glandulifera. Rhodora, xlviii. 412–414.

1947

280. Bartholomew's Cobble. Am. Fern Journ. xxxvii. 1–6.
281. [Review—under Recent Fern Literature.] Dickason's *A Phylogenetic Study of the Ferns of Burma.* Ibid. 26–30.
282. [With W. H. Camp and H. W. Rickett.] Unofficial Special Edition of the International Rules of Botanical Nomenclature. Brittonia, vi, no. 1. 1–120.
283. Robert A. Ware. Am. Fern Journ. xxxvii. 65–67 (portrait).
284. Polypodium lepidopteris and its Relatives in Brazil. Contrib. Gray Herb. clxv. 76–82.
285. Glandular Cystopteris fragilis in the Rocky Mountains. Am. Fern Journ. xxxvii. 122, 123.
286. [Review.] Martens, *Les organes glanduleux de Polypodium virginianum.* Ibid. 124.

1948

287. Asplenium montanum in south-central Massachusetts. Rhodora, l. 20.
288. Reclassifications of the Polypodiaceae. Am. Fern Journ. xxxviii. 7–12.
289. A Proposed New Genus and Family of Ferns. Ibid. 58–61.
290. [Note—under Recent Fern Literature.] On use of bracken for wall-linings. Ibid. 63.

291. [Review—under Recent Fern Literature.] On the study by Martens, *Formations sporangiales et "parasporangiales" chez quelques fougères.* Ibid. 93, 94.
292. [Comments—as a footnote.] On Proposed Changes in International Rules of Botanical Nomenclature. Rhodora, l. 249, 250.

1949

293. William R. Maxon. Am. Fern Journ. xxxviii. 98–105 (portrait).
294. Botanical Nomenclature since 1867. Am. Journ. Bot. xxxvi. 5–7.
295. Rare Scott's Spleenwort . . . One Chance in a Thousand. Horticulture, xxvii. no. 3. 85, 119, 3 photographs.
296. [Review—under Recent Fern Literature.] Study by C. F. Reed. Am. Fern Journ. xxxix. 23.
297. [Review—under Recent Fern Literature.] C. F. Reed's *The phylogeny and ontogeny of the Pteropsida. I. Schizaeales.* Ibid. 59–61.
298. [Review—under Recent Fern Literature.] Wiley's *Ferns of the Northeastern United States.* Am. Fern Journ. Ibid. 61.
299. [Review—under Recent Fern Literature.] Looser's *Los Blechnum (Filices) de Chile.* Ibid. 62.
300. [With W. H. Camp and H. W. Rickett.] Proposed Changes in the International Rules of Botanical Nomenclature. Brittonia, vii, no. 1. 1–51.

A Note on Chrysosplenium iowense.—Dr. Rosendahl's "Studies in *Chrysosplenium,* with special reference to the taxonomic status and distribution of *C. iowense*" in Rhodora **49: 25–36** (1947) was especially interesting for me, as I have been critically studying this genus for these 15 years. After a careful study of *C. iowense* Ryberg and *C. tetrandrum* Fries, he came to the conclusion that they both are well defined species distinct from *C. alternifolium* L. and that *C. iowense* appears to be widely distributed in the Arctic.

In 1939, having examined specimens of *C. iowense,* including the type,[1] in American herbaria, I arrived independently at the same conclusion as Dr. Rosendahl that *C. iowense* is not an endemic species in Iowa, and cannot be separated from an Asiatic form of *C. alternifolium.* So in my monographic treatment[2] of Japanese *Chrysosplenium,* I referred the Asiatic entity to *C. alternifolium* var. *sibiricum* Seringe[3], citing *C. iowense* as its synonym.

[1] In moss, south side of ravine near Decorah, Iowa, *Holway,* May 5, 1889, fl. (TYPE in N. Y. Bot. Gard.; isotype in U. S. Nat. Herb.); Jul. 1888, fr. (Gray Herb.); May, 1893, fl. (U. S. Nat. Herb.).

[2] Hara in Nakai & Honda, Nova Flora Japonica, No. 3: 82–117 (1939).

[3] *C. alternifolium* var. *sibiricum* Seringe in DC. Prodr. 4: 48 (1830).

The following are representative specimens from Asia which are considered conspecific with *C. iowense* of North America.

SIBERIA, *Fischer* misit, Jul. 1825 as *C. sibiricum* Steph. (Gray Herb.); Waigatsch, sinus Warnek, *Ekstam*, 9/8, 1902 (New York Bot. Gard.). SOUTH KAMTCHATKA: Bolsheredsk, *Hultén* 2057, Jul. 8, 1921 (Gray Herb.). MANCHURIA: Khingan Mts., *Yamatsuta*, Jun. 1930 & 1931 (Herb. Sci. Mus. Tokyo). SAGHALIN: Mitliyofka, *Nakahara*, Jun. 24, 1906 (Herb. Univ. Tokyo). Kawakita, *Sugawara*, May 1, 1925 (Herb. Hara). HOKKAIDO: Bihoro, Kitami, *Tomooka*, May 1, 1936 (Herb. Hara); Kiritap, Kushiro, *A. Kimura*, May 21, 1931 (Herb. Hara); Nemuro, leg.?, May 6, 1911 (Herb. Univ. Tokyo).

It is certain that, so far as American materials are concerned, Dr. Rosendahl's statement that *C. iowense* is quite distinct from *C. alternifolium* from Europe is correct. The same is equally true when the above cited specimens from Asia are compared with European *C. alternifolium.* In Eurasia, however, the problem is not so simple. As Dr. Rosendahl has also suggested, *C. iowense* is no doubt closer to *C. alternifolium* than to other species, and some specimens from Asia seem to show variations toward *C. alternifolium.* In the European Alps too, there are forms which closely resemble to *C. iowense* in general appearance. So it is not safe to assert that *C. iowense*, including Asiatic plants, is specifically distinct from *C. alternifolium* before more sufficient material from Eurasia, especially from Siberia, can be examined. It was for this reason that I treated this entity as a geographical variety of *C. alternifolium* in 1939.—HIROSHI HARA, Botanical Institute, Faculty of Science, University of Tokyo, Hongo, Tokyo.

ERRORS OF CITATION IN AGROSTIS AND CONVOLVULUS.—Mr. Haskell Venard kindly calls to my attention a *lapsus* in making a transfer in *Agrostis.* The emended combination is as follows:

AGROSTIS ALBA L., forma **aristigera** (Fernald), comb. nov. *A. stolonifera* L., forma *aristigera* Fernald in RHODORA, xxxv. 317 (1933). *A. alba* L., forma *aristata* Fernald in RHODORA, xlix. 112 (1947), *lapsus calami.*

Although there is the name, without a word of description, *Agrostis alba* L., forma *aristata* Millspaugh, Fl. W. Va. (W. Va.

Agr. Expt. Sta. Bull. no. 24), 469 (1892), that name is invalid, because a *nomen nudum.*

In Rhodora, li. 71 (footnote) (1949), I cited the name *Convolvulus sepium,* var. *repens* as starting with Coleman. Miss Stone notes that Coleman's initial "*C*" stood for *Calystegia.* The author of *Convolvulus sepium,* var. *repens* is Gray.—M. L. Fernald.

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CLXX

THE AMERICAN BARBISTYLED SPECIES OF TEPHROSIA (LEGUMINOSAE)

Carroll E. Wood, Jr.

(Plates 1152–1155)

Introduction

Although the name *Tephrosia* has been used for a genus of moths, it is perhaps more familiar to biologists for a large genus of several hundred species of plants, members of the Tribe Galegeae, Family Leguminosae, widely distributed in warm-temperate and tropical regions. Many of these species produce rotenone and related compounds, so that the group is not only of economic importance as a potential source of insecticides non-poisonous to mammals, but also of ethnological interest in connection with the capture of fish by poisoning. Nevertheless, since the time of DeCandolle no attempt has been made to consider the genus as a whole and even regional monographs have been few and, for the most part, inadequate. To those who have attempted to determine specimens on the basis of existing treatments the need for a revision of the genus should be evident. The high percentage of misidentified specimens in herbaria and the confusion in anthropological, entomological and chemical literature in connection with the use of various species of *Tephrosia* as fish-poisons and insecticides are further indications of the desirability of re-examination of the genus. The large number of species involved, however, and the lack of workable, well-established subgeneric divisions necessitates a piecemeal approach on a regional basis.

Although it was originally intended to attempt a taxonomic revision including all of the North American species, the problem was later recast to deal with only a part of the species of both American continents. This change in emphasis resulted when it became evident that the New World species of *Tephrosia* fall into two rather natural groups: those with glabrous styles and those with bearded or barbate styles. The species with glabrous styles make up a particularly vexing assemblage which it has been impossible to revise in a consistent manner with the information now available. The other group, however, is more amenable to revision, contains a wide range of morphological types and offers a more suitable point for attacking the genus. This paper is limited, therefore, primarily to a survey of the larger, barbistyled group which in the New World occurs principally in North America, with two representatives extending into South America. Various references are made, however, to species with glabrous styles, while much of the general discussion applies to all of the American species; and a list of the names excluded by this style-character is placed at the end of the revision.[1]

Some ninety described species and varieties and many more nomenclatural combinations are involved in the barbistyled group, but a high mortality of binomials in this work leaves the New World with 45 endemic species (including 7 previously undescribed), 2 naturalized exotics and 2 apparent waifs. I do not think, however, that this is needless "lumping," but that specific boundaries are, as a result, more natural and distinct, with the species themselves established on more stable bases than in the past, even though there remain many points of doubt and much to be done, while the interrelationships of most species are anything but clear.

Although almost everyone will agree that in any taxonomic study of a group of plants it is desirable to use information derived from all aspects of the plants and their biology, with some groups certain lanes of approach are, of necessity, either closed or limited until other obstacles are cleared away. It is obvious that it is first necessary to work out a system of interrelationships based on the accumulated information in herbaria with such

[1] For clarity all species belonging to the glabrous-styled group will be marked by an asterisk (*) wherever mentioned in connection with barbistyled species.

geographical and ecological data as may be available. With this as a beginning, further enlightenment may be sought with the aid of more extensive field-study of populations and their ecology, along with anatomical, cytological, genetic and physiological studies. With the additional information thus painfully obtained, the original taxonomic treatment may be remodeled into a more natural one. It is essential first, however, to have some rough outline from which to work.

The revision of the New World barbistyled Tephrosias attempted here is in the nature of that rough outline with a few beginnings of more detailed studies. The approach has been primarily morphological and geographical, with herbarium-specimens as a basis. I have, however, taken the welcome opportunity of escaping from the herbarium to study in the field a number of the species of the United States and Mexico, so that my acquaintance with the genus is not entirely second-hand. A beginning has also been made in the use of cytological data and some anatomical information has been obtained. Unfortunately, the inaccessibility of the regions in which many of the plants grow, the impossibility of obtaining seeds of more than half of the species, the relatively slow growth, deep tap-roots and perennial habit and, particularly, the difficulties of cultivation of most species in the northern part of the United States have precluded environmental manipulations and genetic experiments. In addition, a number of the species from the poorly explored mountains of western Mexico are represented by only one or a few collections, mostly with scanty field-data, so that the distribution, range of variation, flower-color, fruit and seeds are poorly understood or completely unknown. This beginning is presented, however, without apologies, but with the usual hope that it will indicate some of the problems involved and lead to further, more complete, studies of the genus.

Acknowledgments

It is a pleasure to acknowledge the assistance of the many people without whose interest this study would never have been brought to its present state. I am greatly indebted to Professor M. L. Fernald who suggested the problem and under whose direction the work was begun. The revision has been completed

through the guidance, helpful criticism and enthusiastic interest of Professor Lincoln Constance to whom I am especially grateful. Professor I. W. Bailey has displayed a keen interest in the morphological and anatomical aspects of the work and has kindly demonstrated various techniques for me. The late Mr. C. A. Weatherby gave generously, as always, his kindly advice and assistance in nomenclatural problems. I am grateful to Dr. Bernice G. Schubert, Dr. R. C. Foster, Dr. H. E. Moore, Jr., and Miss Ruth D. Sanderson, of the Gray Herbarium, for their assistance with many perplexing matters which have arisen. Dr. Earlene Atchison, of the University of North Carolina, suggested the cytological technique used and gave me much helpful advice on this subject. Dr. E. Lucy Braun, of the University of Cincinnati, has kindly allowed me to study the collections of *Tephrosia* in her private herbarium and I have had the privilege of examining the herbarium of Mr. Ira W. Clokey deposited at the University of California. Mr. A. G. Olsen and Mr. H. N. Cooledge, Jr., aided materially in the preparation of some of the maps. At the University of California, where the work was completed, I have had the welcome advice and help of many friends. The careful collections kindly made by Miss Annetta Carter in Baja California in the spring of 1949 have been very helpful in resolving several problems.

Particular acknowledgment is due for the assistance given me by Harvard University through an Atkins Scholarship in 1947 and a Parker Fellowship in Biology in 1948–49. The first enabled me in the summer of 1947 to undertake field-studies with Dr. and Mrs. I. D. Clement on the southeastern Coastal Plain and then in Cuba, where a month was spent at the Atkins Garden and Research Laboratory of Harvard University at Soledad, near Cienfuegos. I am indebted to Dr. A. G. Kevorkian, then Director, for many favors during the stay at Soledad. As a Parker Fellow in 1948, I was able to spend two months in field-study in Mexico with Dr. H. E. Moore, Jr., now of the Bailey Hortorium, Cornell University. Data and seeds from numerous species of *Tephrosia* studied in the western Sierra Madre have resulted in the clarification of a number of problems.

The curators of the following institutions (designated in the

text (by the initials here given[1]) have generously permitted me to borrow extensively from the abundant material in their care:

A	Arnold Arboretum, Harvard University
CAS	California Academy of Sciences
DS	Dudley Herbarium, Stanford University
DUKE	Duke University
F	Chicago Natural History Museum
FLAS	Agricultural Experiment Station, University of Florida
GA	University of Georgia
GH	Gray Herbarium, Harvard University
ISC	Iowa State College
K	Royal Botanic Gardens, Kew
KSA	Kansas State Agricultural College
KY	University of Kentucky
MEXU	Instituto de Biologia, Universidad Nacional de México
MIAMI	Buswell Herbarium, University of Miami, Coral Gables
MO	Missouri Botanical Garden
NEBC	New England Botanical Club
NY	New York Botanical Garden
OKL	University of Oklahoma
PH	Academy of Natural Sciences of Philadelphia
PHBC	Philadelphia Botanical Club
POM	Pomona College
SMU	Southern Methodist University
TENN	University of Tennessee
TEX	University of Texas
UC	University of California (including the Clokey Herbarium)
US	United States National Herbarium
WVA	West Virginia University

Historical Account

The confused history of *Tephrosia* as a genus began with Linnaeus who, in the first edition of *Species Plantarum* (1753), set off the genus *Cracca* with six species, all of which are currently recognized as species of *Tephrosia*. Later, however, he doubted the distinctness of *Cracca* and merged it with *Galega* (Linnaeus 1759, p. 1172),[2] where it remained in obscurity until resurrected by Kuntze in 1891.

After Linnaeus numerous species were described under *Galega* (which became more or less a catch-all) and at least four other generic names were applied to plants now included in *Tephrosia*. The genus *Tephrosia* itself was proposed as segregate from *Galega* by Persoon (1807, pp. 328–330) who transferred into it a rather heterogeneous series of species, including the original *Craccae* of Linnaeus (and related species) as well as plants now

[1] Most of the abbreviations adopted are those suggested by Lanjouw (1939, 1941).

[2] In a footnote he explains, "Galegam 770 & Craccam 795 *genere sub eodem comprehendi docuere recentiores observationes*".

recognized as belonging to very different genera. Although *Tephrosia* Pers. was thus a superfluous name (including as it did *Cracca* L.), it was adopted by most writers and the extraneous elements gradually removed to other genera, leaving the genus taxonomically essentially as now understood and nomenclaturally synonymous with *Cracca* L.

Some of the last of the discordant elements included in *Tephrosia* by Persoon were removed by Bentham (1853) who erected for them an entirely new genus *Cracca*[1], based on *Galega caribaea* Jacq., a plant morphologically quite different from true *Tephrosia* Pers. (*Cracca* L.). The situation was still further complicated by the appearance of a third genus *Cracca* when Alefeld (1861), agreeing with Grenier and Godron (1848), revived the pre-Linnaean *Cracca* Riv. (1691)[2] for a portion of *Vicia* L. Adopting the view that this earlier use of the name necessitated new names for both *Cracca* L. and *Cracca* Benth., Alefeld (1862) continued the use of *Tephrosia* Pers. for the former and proposed a new name, *Benthamantha*, for the latter. Most authors, however, either overlooked or ignored Alefeld and continued to use *Tephrosia* Pers., *Cracca* Benth. and *Vicia* L. (*sens. lat.*). Finally, to make the confusion complete, Kuntze (1891), on the basis of priority, adopted *Cracca* L. for *Tephrosia* Pers., transferred all the known species of *Tephrosia* to that genus and, apparently not knowing of Alefeld's *Benthamantha*, proposed yet another name, *Brittonamra*, for *Cracca* Benth.

Cracca [Riv.] Medic. has not seriously been considered as a genus since Alefeld, but *Cracca* L. and the very different *Cracca* Benth. have inevitably been badly tangled nomenclaturally. Although *Tephrosia* Pers., which had been widely used for almost a hundred years, was conserved over both *Cracca* L. and *Cracca* Medic. by the International Botanical Congress of 1905 and was again included in the list of *nomina conservanda* in 1910, adherents to the American Code continued to recognize *Cracca* L. as the proper name for the genus. *Cracca* Benth.,

[1] Although the name is usually cited as of Benth. ex Oerst., both Bentham and Oersted are the authors of this paper. The proper citation is *Cracca* Benth. ex Benth. & Oerst.

[2] Although these authors attributed the genus to Rivinius, under the present rules this is properly *Cracca* Medic. Vorles. Churpf. Phys. Ges. 2: 359. 1787, which was proposed as a segregate from *Vicia* L., based on *V. Gerhardi* Jacq., *V. benghalensis* L. and a new species, *C. syriaca*. It is treated by most authors as a section of *Vicia* L. or as a synonym under that genus.

twice a later homonym, became *Benthamantha* Alef. However, with the demise of the American Code the conservation of *Tephrosia* was again confirmed (Briquet 1935) and has been generally accepted.

Cracca Benth. has now been proposed and accepted for conservation (Rehder et al. 1935; Sprague 1940), but has not yet been acted upon by a Botanical Congress. The proposed conservation of this name which, although rather generally accepted until fifty years ago, has since become surrounded by an aura of confusion, at least in the United States, would not seem to contribute to nomenclatural clarity. It would appear better to eliminate the name completely and to continue to use *Benthamantha* Alef. There could then be no doubt as to which genus was intended. It is to be hoped, however, that, should *Cracca* Benth. be approved as a conserved name by the next International Botanical Congress, the confusion will abate in time.

The nomenclatural confusion aside, *Tephrosia*, as a genus, has been the subject of relatively few treatments. No attempt has been made since A. P. DeCandolle (1825, pp. 248–256) to monograph the genus on a world-wide scale, although several regional works have treated it in part. E. G. Baker (1926) revised the species of tropical Africa, recognizing 146 species, many of which were based on variable pubescence-characters. According to an excellent recent monograph (Forbes 1948), 67 species are known from South Africa. The most recent monograph of the Australian species is that of Domin (1926, pp. 746–756) who concluded that 23 species occur in that continent. The Asiatic species have not yet, to my knowledge, been treated as a group.

Although numerous short papers concerned with North American Tephrosias have been published, only four have dealt with these at any length. The first was a "Revision of the North American Species of *Cracca*" by Anna Murray Vail (1895). She concluded that 14 species and 3 varieties occurred in "North America" (i. e., the United States). Four years later B. L. Robinson (1899), dissatisfied with Miss Vail's work, published a somewhat more useful "Revision of the North American Species of *Tephrosia*," still restricting North America to the United States and including 12 species and 5 varieties. A further treat-

ment of importance was not forthcoming until Standley (1922) brought together in his "Trees and Shrubs of Mexico" much of the available information concerning 26 Mexican species.

It remained, however, for Rydberg (1923) to monograph the species occurring in North America, including the West Indies. This work, in which he treated 72 species, 16 of which were described as new, is far from satisfactory, for many of the specific descriptions are little more than rewordings of the original, usually inadequate diagnoses, the keys contradict both themselves and the descriptions, and the specific lines are often finely drawn and based entirely on such inconstant characters as pubescence of the vegetative organs. Rydberg's herbarium annotations follow the outlines of his monograph and indicate that he did not clearly understand many of the entities with which he was dealing. However, handicapped though he was by the relatively few specimens then available and by his extreme tendency toward "splitting", his work remains to date the only outline of the North American species. About 50 of the 72 species given by Rydberg appear to represent "good" species.

Various notes concerning South American species have been published, but apparently nothing dealing expressly with these as a group has appeared. Bentham in Martius, Fl. Bras. **15** (1): 46–50. 1859, recognized 7 species in Brazil. Comments on the genus in Brazilian Amazonia are included in Ducke's work (1939) on the legumes of that region and Burkart (1943) records 3 species from Argentina in his study of the legumes of that country. A number of species were dismembered by Chodat and/or Hassler in various publications.

Economic Importance

Various species of *Tephrosia* have been used as fish-poisons in the Americas, Africa, Asia and Australia. It is remarkable that primitive peoples in such isolated parts of the world, lacking any apparent communication with one another, have discovered and domesticated species of the same genus for the same purpose, the poisoning of fish. The species most frequently mentioned in this connection are *Tephrosia Sinapou* in the Caribbean area and South America, *T. multifolia* and *T. Sinapou* in Central America,

T. Vogelii and *T. macropoda* in Africa, and **T. rosea* and **T. astragaloides* in Australia.

An early account of fish-poisoning with *Tephrosia Sinapou* in Jamaica illustrates the general method used in capturing fish:

> The leaves and branches of this plant, being well pounded and thrown into any river, pond, or creek, are observed to infect the waters very soon: by which all the fish are immediately intoxicated and rise and float upon the surface, as if they were dead; from whence they are easily taken. But most of the large ones that are left recover from this trance, after a short time: tho' the greatest part of the small fry perish on those occasions (Browne 1756, p. 296).

Although in this instance the shoots are toxic to fish, in other species only the roots are used, the foliage being completely harmless. *Tephrosia Sinapou* appears to have been widely cultivated in the Caribbean region in pre-Columbian times and even later. Browne (1756) notes that it was "introduced to *Jamaica* from the main", and was "cultivated in many parts of the island, on account of its intoxicating qualities". With the near extinction of the Indians of the Caribbean, however, the plant has become rare in the West Indies, although it is still widely cultivated in South America as a fish-poison.

Some species have long been used by primitive peoples as insecticides, as well as fish-poisons, and in recent years have come to the attention of economic entomologists and chemists. The toxic qualities of these plants are due to the presence of rotenone, deguelin and related compounds which are chemically identical with those found in *Derris* and *Lonchocarpus*, the commercial sources of rotenone. They are not, however, present in such large quantities as in those plants, and this factor limits the commercial exploitation of *Tephrosia* species at the present time. The maximum rotenone- and deguelin-content of *Tephrosia virginiana*, for example, is about 4 per cent, whereas Derris and *Cube* often contain 10 per cent or more (Roark 1937).

Nevertheless, rotenone has become so important as an insecticide non-poisonous to mammals that extensive surveys have been conducted by the U. S. Department of Agriculture to determine the feasibility of cultivating native species as commercial sources. In 1934 and 1935, many of the species of the southeastern United States were tested, but only *Tephrosia virginiana* (including *T. latidens*) appeared to be promising (Sievers, Russell et al.

1938). As a result, cultural experiments in the United States have been confined to this species.

In the course of one of these surveys (1935), plants of *Tephrosia virginiana* from many localities from Virginia southward and westward were tested for the presence of rotenone. Large areas were found to lack completely any toxic plants, but plants with relatively high rotenone content were found in light, sandy soils in northeastern and western Florida, and in northeastern Texas within a narrow belt extending some 300 miles between Caldwell and Harrison counties. Secondary districts were located in Georgia, Louisiana, Texas and Oklahoma. The evidence accumulated at that time suggested that the presence of toxic substances was controlled by genetic factors, the expression of which was affected by the environment, particularly edaphic conditions (Sievers, Russell et al. 1938). Transplant-experiments have since indicated that the controlling factors are indeed hereditary, for plants with high rotenone-content retain their toxicity when transferred to a region yielding only mediocre material, and also when transferred from one soil-type to another. It has also been shown that highly toxic plants tend to produce offspring of similar toxicity (Little 1942).

Tephrosia virginiana responds well to cultivation in sandy soils, requiring little attention and giving economically promising yields. The roots, in addition to producing rotenone[1], harbor nitrogen-fixing bacteria. The leaves and stems of this species are non-toxic and have some value as hay.

A great mass of technical literature concerning the use of *Tephrosia* as an insecticide has accumulated in the last 20 years. The portion up to 1937 has been thoroughly reviewed by Roark (1937). A more general account up to 1941 of the literature concerning plants of possible insecticidal value has been given by McIndoo (1945).

Tephrosia species have also been utilized in tropical agriculture as green manures, cover-crops, soil-binders and contour-hedges. Most of the species so used are native to the Eastern Hemisphere, although "*Tephrosia toxicaria*" (either *T. Sinapou* or *T. multifolia*) has been grown as a green manure in the Nether-

[1] Rotenone is found concentrated in the xylem and not in the bark. All roots contain the same proportion of toxic substances regardless of size (Sievers, Russell et al. 1938).

lands Indies. **Tephrosia noctiflora* appears to have been introduced into the West Indies as a cover-crop, as perhaps was *T. candida*.

Various medicinal properties have been assigned to *Tephrosia* species. Among these may be mentioned the use of the roots of *T. virginiana* as a vermifuge by the Indians of eastern North America (Griffith 1847; Rafinesque 1830). The purgative propties of **T. Senna* HBK. (*T. cathartica*) are further commemorated by the common name "Wild Senna" in the British West Indies.

The ornamental possibilities of *Tephrosia* have been little explored, although *T. Vogelii* is cultivated in tropical Africa both as a fish-poison and as an ornamental shrub. *Tephrosia macrantha*, a shrub of western Mexico with large attractive flowers and a long blooming period, would probably make a very desirable cultivated plant in frost-free regions.

Cytology

In addition to the usual morphological characters, an attempt was made to utilize the chromosome-numbers of some of the species of *Tephrosia* as a systematic criterion. More data of this type seemed to be particularly desirable since Senn (1938), in reviewing the chromosomal relationships within the Leguminosae, had indicated that the genus was evidently in need of careful chromosomal, as well as taxonomic, study.

Efforts were made in the summer of 1947 to secure counts of meiotic chromosomes, particularly those of **Tephrosia cinerea*, at the Atkins Garden and Research Laboratory at Soledad, Cuba. These attempts were all unsuccessful, probably because of the sporadic flowering of the inflorescence. The available species of the southeastern United States proved equally difficult. In consequence, chromosome counts from root-tips have been relied upon exclusively.

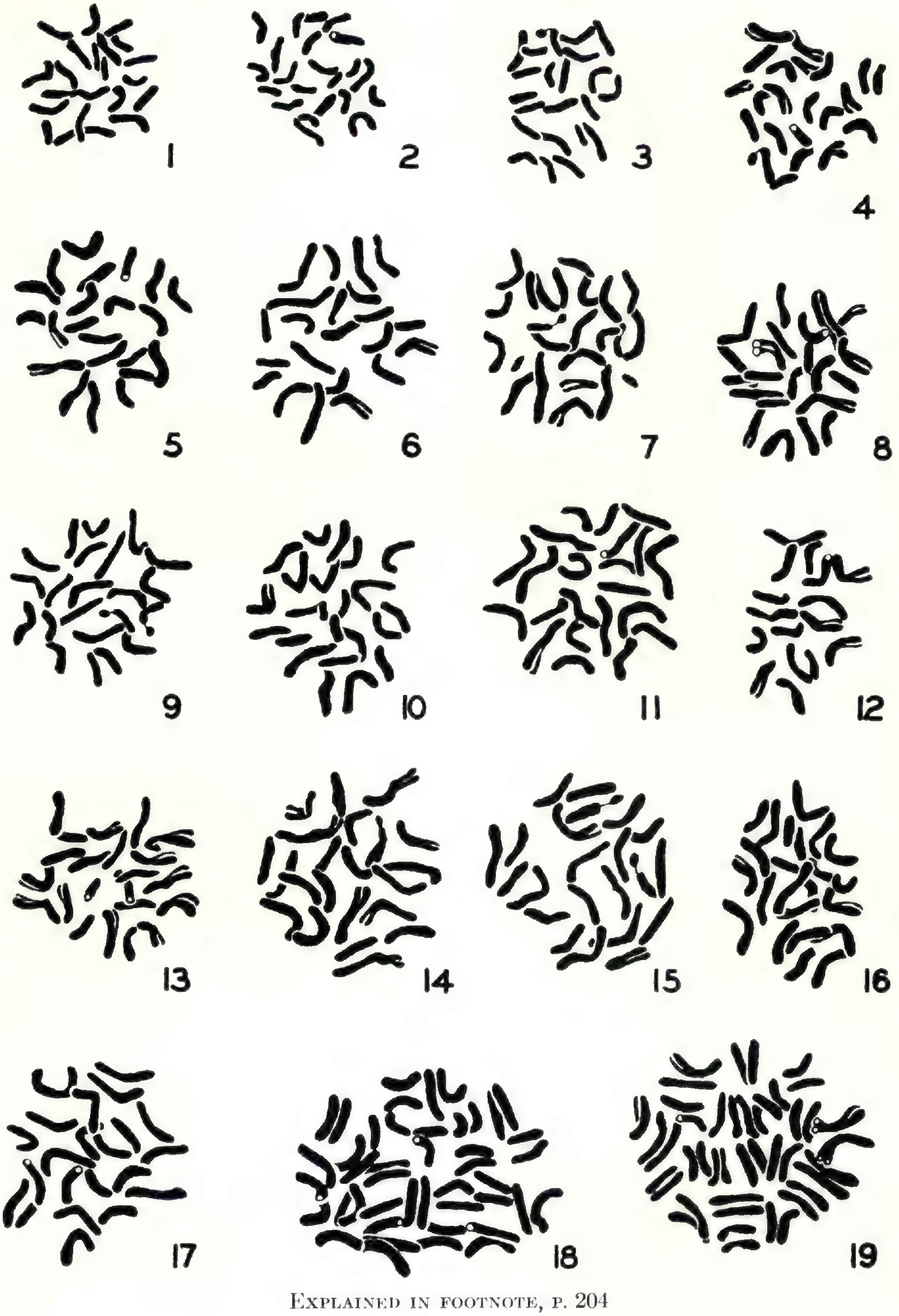
Mature seeds of seven species of *Tephrosia* were collected in the southeastern states and seeds of **T. cinerea* in Cuba in 1947. In 1948, 3 more species were added from Texas and Mexico. At Soledad fresh, nearly mature but still quite green seeds of **T. cinerea* germinated immediately in moist Petri dishes, producing vigorous root-tips. In addition, seeds taken from herbarium-specimens have, in many instances, germinated readily. Perma-

nent slides were prepared[1] and chromosome-counts obtained for 27 species. The diploid number is 22 in all. (See Table 1 and Plate 1152).[2]

The chromosome-numbers of only two species have been recorded previously. These are "*T. Hookeriana* W. & A." (probably = *T. villosa* (L.) Pers.), n = 16, according to Kawakami (1930) and *T. virginiana* (L.) Pers., n = 11, reported by Senn (1938, p. 231). The occurrence of these two numbers within the genus was pointed out by Senn as remarkable, particularly since 11 was a number unknown elsewhere within the Tribe Galegeae, 8 being the basic number of most genera. Since then, however, 13 species with 11 pairs of chromosomes have been reported in *Astragalus* (Vilkomerson 1943), a genus previously believed to have only 7 and 8 as the basic numbers, so that the occurrence of 8 and 11 in *Tephrosia* would not necessarily be particularly remarkable. The counts of 27 species of *Tephrosia*, all with 22 somatic chromosomes, suggest, moreover, that the genus is probably very uniform in chromosome-number and strongly indicate that the reported haploid number of *T. Hookeriana* is erroneous. Since the species counted represent a wide range of morphological types, including three Old World species (one presumably a close relative of *T. Hookeriana*), it is likely that these results are fairly conclusive, except for the possibility of polyploid species. To

[1] The seed-coats of dry, mature seeds were sterilized by immersion in 70 per cent alcohol for a few minutes and scarified with a scalpel. The seeds were then rinsed in sterile distilled water and placed on moist filter-paper in sterile Petri dishes. Imbibition of water took place rapidly and germination often followed overnight. Root-tips were stained whole by the Feulgen technique following Belling's or Randolph's fixative, embedded in paraffin via ethyl alcohol and chloroform, sectioned at 10 microns, affixed to slides, passed through xylene to remove the paraffin and finally mounted in balsam. Good results are difficult to obtain in this group with any of the various smearing or "squashing" techniques. Drawings of the chromosomes were made with camera lucida, oil-immersion objective (90x) and 20x compens oculars. Counts are documented by specimens in the herbaria indicated in Table 1.

[2] PLATE 1152. Somatic Chromosomes of *Tephrosia* and *Sphinctospermum*. Mitotic figures from root-tips. Figure 4 ca. 2750 ×, all other figures ca. 2600 ×. All documenting specimens in (GH). 1. **Tephrosia vicioides* (Purpus 8171); 2. **T. tenella* (Gentry 4684); 3. **T. noctiflora* (Archer 2557); 4. **T. angustissima* (Wood & Clement 7492); 5. *T. virginiana* (Wood & Clement 7605); 6. *T. Sinapou* (Pringle 11436); 7. *T. Conzattii* (Hinton 6998); 8. *T. foliolosa* (Gentry 5279); 9. *T. nitens* (Hinton 11037); 10. *T. belizensis* (Schultes & Reko 552); 11. *T. spicata* (Wood & Clement 7531); 12. *Sphinctospermum constrictum* (Gentry 4676); 13. *T. hispidula* (Wood & Clement 7194); 14. *T. florida* (Wood & Clement 7596); 15. *T. chrysophylla* (Wood & Clement 7172a); 16. *T. Rugelii* (Wood & Clement 7512); 17. *T. florida* (topotype of *T. gracillima*) (Wood & Clement 7202); 18. *T. chrysophylla*, tetraploid cell (Wood & Clement 7525a); 19. *T. Rugelii*, tetraploid cell (Wood & Clement 7512).



Explained in footnote, p. 204

TABLE 1
Chromosome-Numbers of *Tephrosia*, *Cracca* and *Sphinctospermum*

Species	2n	Collection	Year	Locality
T. multifolia	22	Rose, Standley & Russell 14227 (GH)	1910	Nayarit
	22	Calderón 2611 (F)	1933	El Salvador
T. foliolosa	22	Gentry 5279 (GH)	1939	Durango
T. Sinapou	22	Pringle 11436 (GH)	1903	Jalisco
T. leiocarpa	22	Gentry 4894 (GH)	1939	Sonora
T. Conzattii	22 22+2f	Hinton 6998 (GH)	1934	México (State)
T. virginiana	22	Wood & Clement 7605 (GH)	1947	South Carolina
	22	7613 (GH)	1947	North Carolina
T. onobrychoides	22	Moore & Wood 3616 (GH)	1948	Texas
T. rhodantha	22	Hinton 11641 (GH)	1937	Guerrero
T. cana	22	Carter, Alexander & Kellogg 2406 (UC)	1947	Baja California
	22	Gentry 4366 (DS)	1939	Baja California
T. Palmeri	22	Gentry 3718 (MO)	1938	Baja California
T. Rugelii	22	Wood & Clement 7170 (GH)	1947	Florida
		7512 (GH)	1947	Florida
T. spicata	22	Wood & Clement 7178 (GH)	1947	Florida
	22	7531 (GH)	1947	Florida
	22	7608 (GH)	1947	North Carolina
T. hispidula	22	Wood & Clement 7194 (GH)	1947	Florida
	22	7547 (GH)	1947	Florida
T. florida	22	Wood & Clement 7089 (GH)	1947	South Carolina
	22	7202 (GH)	1947	Florida
	22	7527 (GH)	1947	Florida
	22	7532 (GH)	1947	Florida
	22	7560 (GH)	1947	Georgia
	22	7565 (GH)	1947	Georgia
	22	7596 (GH)	1947	South Carolina
	22	7598 (GH)	1947	South Carolina
	22	7607 (GH)	1947	North Carolina
T. chrysophylla	22	Wood & Clement 7172a (GH)	1947	Florida
	22	7525a (GH)	1947	Florida
T. Lindheimeri	22	Moore & Wood 3617 (GH)	1948	Texas
T. potosina	22	Moore & Wood 3618 (GH)	1948	Nuevo León
T. nitens	22	Hinton 11037 (GH)	1937	Guerrero
T. belizensis	22	Schultes & Reko 552 (GH)	1939	Oaxaca
T. grandiflora	22	Orcutt 3235 (UC)	1927	Jamaica
T. Vogelii	22	No voucher; identified from seeds only, but these unmistakable.	1946	Cultivated, Bianchi, Guatemala
**T. cinerea*	22	Wood 7537 (GH)	1947	Cuba
**T. Senna*	22	Rose et al. 3228 (GH)	1913	St. Kitts, British West Indies
**T. tenella*	22	Gentry 4684 (GH)	1939	Sonora
**T. angustissima*	22	Wood & Clement 7492 (GH)	1947	Florida
**T. vicioides*	22	Purpus 8171 (GH)	1918	Veracruz
**T. noctiflora*	22	Archer 2557 (GH)	1934	Cultivated, British Guiana
Cracca sp.	16	Hinton 8740 (GH)	1935	México (State)
Sphinctospermum constrictum	16	Gentry 4676 (GH)	1939	Sonora

* Styles glabrous.

date, no polyploids have been found, although a few tetraploid cells were encountered in the roots of *T. chrysophylla*, *T. florida* and *T. Rugelii* (Pl. 1152, fig. 18, 19). Such polysomatic cells have been found more or less irregularly, both in the roots of a number of leguminous genera (Atkinson 1948; Vilkomerson 1943) and in various tissues of other families as well, and may be a normal feature of differentiated tissues (Huskins 1948).

The apparent uniformity of chromosome-number in *Tephrosia*, at least in the Western Hemisphere, is disappointing at the species-level, but is interesting as a generic character. Few of the supposedly related genera have been studied cytologically, but two species of *Galega* have been reported with 8 pairs of chromosomes (Kreuter 1929, 1930; Senn 1938). A single species of *Cracca* and the monotypic *Sphinctospermum* also have 8 pairs, although neither of these genera is particularly closely related to *Tephrosia*. The presence of 8 pairs of chromosomes in *Sphinctospermum* is especially interesting, since this plant was originally described as a *Tephrosia* by Sereno Watson. Rose erected a new genus for it on morphological grounds; the chromosome-numbers strengthen this already strong segregation. In both morphology and chromosomes it is much more closely related to *Cracca* Benth. than to *Tephrosia*.

With the amount and type of material now available it seems unwise to attempt to utilize chromosome-morphology as a comparative character. From a glance at Plate 1, however, it will be evident that the chromosomes of at least some of the glabrous-styled species are noticeably smaller than those of barbistyled species and that satellites are present on two chromosomes. Unfortunately, although the satellites are large, they are seldom visible, even in species in which they have definitely been observed. It may also be noted that absolute chromosome-size varies considerably from one cell to another within the same root-tip. In addition, one possible example of ageing in 15-year-old seeds of *Tephrosia Conzattii* is found in the appearance of 22 chromosomes plus 2 fragments in dividing cells of one seedling root-tip (Plate 1152, fig. 7). A second root-tip had 22 apparently "normal" chromosomes.

Longevity of Seeds

Incidental to securing root-tips for chromosome-counts, a few data concerning the longevity of seeds of *Tephrosia, Cracca* and *Sphinctospermum* have accumulated. The results from herbarium-collections are given in Table 2; freshly collected seeds usually give almost 100 per cent germination. While the quantities of seeds employed are too small to be statistically significant, the results are interesting in that they conform to the findings of Becquerel, Ewart, Turner, Schelderup-Ebbe and others that seeds of Leguminosae are relatively resistant to ageing and retain the power of germination for long periods.

It is of interest to note that the seeds used in the present experiments were taken from specimens which, at least in the Gray Herbarium, have been stored for the periods indicated in a very dry, steam-heated building. These have, in addition, been fumigated with carbon bisulfide at least twice. That any seeds at all germinated attests to the impervious nature of the seed coats.

In the fall of 1948, 15 seeds of *Tephrosia potosina* and 5 of *T. onobrychoides* (*Moore & Wood 3618* and *3616*, respectively) were subjected to the heat-treatment newly initiated at the University of California to rid herbarium-specimens of insects. In this process the temperature of an insulated room containing the specimens is raised slightly above 60° C. for about 12 hours and then allowed to return slowly to normal. All insects are destroyed by this treatment, but all 20 of the fresh seeds were apparently unharmed and germinated immediately.

These data from *Tephrosia* hardly compare, however, with records of Becquerel and Ewart of old seeds kept in herbaria or seed-cupboards. Crocker (1938) has summarized their material in reviewing the literature concerning the life-span of seeds. The following are the oldest definitely known records, all from leguminous species except the last:

Cassia bicapsularis L.	115 years old	40%	germination
Cassia multijuga Rich.	158	100%	
Goodia lotifolia Salisb.	105	7.7%	
Hovea linearis R. Br.	105	17%	
Nelumbo nucifera L.	150	85%	

Other records of Becquerel, Ewart, Turner and Schelderup-Ebbe as given by Crocker show several additional legumes re-

TABLE 2

Longevity of Seeds of *Tephrosia, Cracca* and *Sphinctospermum*

Species	Collection	Year	Age at test	No. tested	No. germinated	% germination
**Tephrosia tenella*	Hinckley 2959 (GH)	1944	3 yrs.	3	3	100
**T. tenella*	Gentry 4684 (GH)	1939	8	2	2	100
Sphinctospermum constrictum	Gentry 4676 (GH)	1939	8	5	5	100
T. belizensis	Schultes & Reko 552 (GH)	1939	8	4	4	100
T. foliolosa	Gentry 5279 (GH)	1939	8	2	1	50
T. cana	Gentry 4366 (DS)	1939	8	1	1	100
T. leiocarpa	Gentry 4894 (GH)	1939	8	5	4	80
T. Palmeri	Gentry 3718 (MO)	1938	10	2	2	100
T. nitens	Hinton 11037 (GH)	1937	10	2	1	50
T. rhodantha	Hinton 11641 (GH)	1937	10	5	5	100
Cracca sp.	Hinton 8740 (GH)	1935	12	4	3	75
T. Conzattii	Hinton 6998 (GH)	1934	13	5	1	20
**T. noctiflora*	Archer 2557 (GH)	1934	13	5	2	40
T. multifolia	Calderón 2611 (F)	1933	15	6	5	83
T. grandiflora	Orcutt 3235 (UC)	1927	21	6	4	66
T. multifolia	Standley 20463 (GH)	1922	25	10	1	10
**T. vicioides*	Purpus 8171 (GH)	1918	29	13	6	46
**T. Senna*	Rose et al. 3228 (GH)	1913	34	3	2	66
T. multifolia	Rose, Standley & Russell 14227 (GH)	1910	37	9	1	11
T. Sinapou	Pringle 11436 (GH)	1903	44	4	2	50
T. leiocarpa	Pringle 11434 (GH)	1903	44	1	0	0
T. leucantha	Palmer 745 (GH)	1898	49	4	0	0
T. leiocarpa	Palmer 594 (GH)	1886	61	7	0	7
	Palmer 594 (US)	1886	62	8	1	

* Styles glabrous.

taining the power of germination after 80 years. Species with a known life-span of over 50 years include representatives of the Iridaceae, Cannaceae, Tiliaceae, Malvaceae, Euphorbiaceae, Convolvulaceae and Labiatae.

From casual observation the unsuccessful germination of *Tephrosia* seeds appeared in many instances to be due to the failure of the hypocotyl and radicle to grow. The cotyledons often remained firm and alive and in some cases expanded and became green in sunlight.

Morphology and Taxonomic Criteria

As with many genera of Leguminosae, *Tephrosia* is not distinguished by an abundance of readily utilizeable taxonomic

characters. Many parts of the plant are so variable or differ so little from one species to another that no taxonomic value can be assigned to them. Although one plant may differ from another in appearance, the problem has been one of establishing such differences on firmly objective bases. To this end as many aspects of the plant as possible have been examined. The criteria which, as a result, have been chosen are, in large part, different from those used by Rydberg and other American authors. A surprising number of characters have been found in the flowers in spite of their apparently uniform papilionaceous structure. Other characters are located in the inflorescence, fruit and some of the vegetative parts, notably the leaves. No single criterion, however, can be employed throughout the genus, so that specific delimitations are usually on the basis of varying sets of characters from one group of species to another. Notes on morphology apply primarily to the species dealt with in this revision, although much of this material will apply as well to the species with glabrous styles.

Habit.—All of the American species are perennial, although **Tephrosia tenella* apparently flowers the first year from seed and may sometimes behave as an annual plant. Both herbaceous and fruticose types are included, but almost all species are somewhat woody at the base, the herbaceous types springing from a woody crown. The erect, decumbent, or prostrate habit may be of diagnostic value, but such information is seldom included on herbarium labels. *Tephrosia chrysophylla*, for example, is always completely prostrate, but in a presumed hybrid of this species with *T. florida* the stems are prostrate while the leaves are usually ascending.

Branching of the herbaceous species is either monopodial or sympodial, but this character does not seem to be of any very fundamental importance. (See *Inflorescence* and RELATIONSHIPS.)

Roots.—A heavy, woody tap-root is present in many species, but is not often collected. In *T. hispidula* this is characteristically carrot-like, in contrast to the cylindrical roots of *T. florida* and *T. spicata*, species with which it is sometimes confused. The roots of *T. virginiana* are many, long, slender, very tough and account for the popular names "cat-gut" and "devil's shoestring".

Leaves.—In all of the American species the leaves are im-

paripinnate with from one to forty-one leaflets, the leaflet-number varying within definite limits in each species. In seedlings the lowermost leaves are few-foliolate, but the leaflets increase in number with each successive leaf until a specific limit is reached. The same is, to a large degree, true of leaves produced by older plants within a season.

Petioles are usually present on at least some of the leaves, but the length of the petiole generally decreases from the lower leaves upward. Length is, therefore, usually of little value as a diagnostic character, although it is important in distinguishing the putative hybrid, *T. chrysophylla* × *T. florida,* from its parents, both of which are extreme types. The rachis and sometimes the petiole are channeled on the upper side.

The *leaflets,* which range from narrowly linear to orbicular, from 0.5 to 18 cm. long, and from membranous to thick and leathery, are important points of recognition, once the range of variability has been determined.

More or less prominent parallel lateral veins are given off obliquely from the midrib of the leaflet in all species. The areoles formed by the veinlets between these veins are, with a few intermediate exceptions, either elongate or nearly isodiametric. This feature might appear to be correlated to some extent with the shape and width of the leaflet, but this is not necessarily so, as is evidenced by several pairs of species with leaflets of approximately the same shape and size but areoles of different shapes. The venation-type, which is usually constant within a species, is summarized in Table 3. With the exception of the few somewhat confusing intermediates, the shape of the areoles is a useful character and is, in general, correlated with the presence or absence of stomata in the upper epidermis. It will also be noted from Table 3 that these types seem to run in series of related species (which, incidentally, were determined on the basis of gross morphology before these features were studied in detail).

The presence or absence of stomata in the upper epidermis appears to be characteristic of many species. It almost goes without saying, however, that such an anatomical feature needs much more careful study with emphasis on the effect of environmental fluctuations before much dependence can be placed on it as a specific character. Nevertheless, in at least some species

this seems definitely to be a constant characteristic. The stomata of most of the species with dull, thin leaves can be seen under a strong dissecting microscope as light flecks in the dried leaflet-tissue. In these species stomata are invariably present in the upper epidermis.

Stomata are completely absent from the upper epidermis of a number of species with more or less coriaceous leaves, although in other species they may be present along the midrib only, while in still others they may be either present or completely absent (Table 3).[1] The presence or absence of stomata supplies a useful supplementary character (although one which will hardly be employed enthusiastically by most taxonomists, including myself) in distinguishing between *Tephrosia Pringlei* and *T. Seemannii* and to lesser extent between *T. Langlassei* and *T. simulans*. Without exception, in all the specimens I have seen, stomata are present in the upper epidermis of *T. Pringlei* but completely absent from that of *T. Seemannii*. This difference is correlated with elongate areoles between the lateral veins of *T. Pringlei* and nearly isodiametric areoles in *T. Seemannii*.

All leaflets are petiolulate and probably exhibit turgor-movements, particularly in connection with changes in light-intensity. Sleep-movements and orientations of the leaflets in sunlight have been observed in **Tephrosia cinerea*, **T. tenella*, *T. belizensis*, *T. nicaraguensis*, *T. rhodantha* and *T. spicata* and probably occur in all species. One specimen of *T. multifolia* (*Mexia 1113*) is noted on the label as exhibiting a slight sensitivity to touch. Stipels are always absent.

Stipules vary from setaceous to lanceolate and are either deciduous or persistent and brown or green in all the endemic species. The conspicuous, ovate, brown or reddish stipules of *T. grandiflora*, a native of South Africa naturalized in Jamaica, are a notable exception. In general stipules are too uniform, exhibiting the same variations from one species to another, to be of much diagnostic value.

[1] Large pieces of epidermis and cuticle of species with relatively rigid, coriaceous leaflets may conveniently be removed from leaflets of herbarium specimens by the method recommended by Bailey and Nast (1948). Leaflets are first boiled in water and then macerated in equal parts of 5% nitric and 5% chromic acids at 56° C. Two to four hours are sufficient for most *Tephrosia* species, depending upon the thickness of the leaflets. This method is unsatisfactory with thin-leaved species, such as *T. virginiana*, *T. Sinapou*, *T. spicata*, etc.

TABLE 3

Areoles, Stomata and Glands of Indigenous American Barbistyled Tephrosias

	Isodiametric (+), elongate (–), or intermediate (±) areoles between lateral veins of leaflets	Presence (+) or absence (–) of stomata in upper epidermis of leaflets	Presence (+) or absence (–) of glands on Leaflets	Presence (+) or absence (–) of glands on Legume
1. *T. multifolia*	–	+		
2. *T. foliolosa*	–	+		
3. *T. macrantha*	–	+		
4. *T. Sinapou*	–	+	–	+
5. *T. leiocarpa*	–	+		
6. *T. Conzattii*	–	+		
7. *T. cuernavacana*	–	+		
8. *T. leucantha*	–	+		
9. *T. Thurberi*	–	+		
10. *T. virginiana*	–	+		
11. *T. onobrychoides*	–	+	–	+
12. *T. rhodantha*	–	+	–	+
13. *T. cana*	–	+		
14. *T. Palmeri*	–	+		
15. *T. Rugelii*	–	+		
16. *T. spicata*	–	+	–	+
17. *T. hispidula*	–	+	–	+
18. *T. florida*	–	+	–	+
19. *T. chrysophylla*	–	+		+
20. *T. tepicana*	+	+		
21. *T. madrensis*	+			
22. *T. Lindheimeri*	–	+	–	–
23. *T. potosina*	–, ±	+	–	–
24. *T. saxicola*	+, ±	+, –	+	
25. *T. Seemannii*	+	–	– ?	
26. *T. Pringlei*	–	+	+	
27. *T. nicaraguensis*	+	–		– ?
28. *T. submontana*	+, ±	–	+	
29. *T. nitens*	–			
30. *T. hypoleuca*	?			
31. *T. vernicosa*	+	–	+	
32. *T. pogonocalyx*	+	+, –	+	
33. *T. belizensis*	–, ±	–	+	+
34. *T. mexicana*	+, ±	+, –	+	+
35. *T. Langlassei*	+	+, –	+	
36. *T. simulans*	+	–	+	
37. *T. quercetorum*	+, ±	+	+	
38. *T. Watsoniana*	+	–, +	– ?	
39. *T. crassifolia*	+	+, –	+	
40. *T. lanata*	+	–	+	
41. *T. Abbottiae*	+	–, +	+	– ?
42. *T. pachypoda*	+	–		
43. *T. major*	+	–		
44. *T. diversifolia*	+	–		
45. *T. platyphylla*	+	–		

Indument.—The indument is of appressed, spreading, recurved or retrorse, simple bicellular trichomes, varying in length from about 0.1 mm. to 3 mm. These hairs are often somewhat bullate with the short basal cell slightly enlarged. Trichomes are present at least on the lower surfaces of the leaves, on the pedicels, the calyx, the back of the banner and the upper suture of the ovary. The hairs are often twisted and curled in four species with very large and coriaceous leaves.

Small, flat, obovate or club-shaped glandular hairs composed of 8–10 cells in a single layer occur on the leaflets and legumes of some species. These are so inconspicuous as to pass unnoticed even under a powerful dissecting microscope and unfortunately it was not until near the end of this study, when the epidermis of leaflets was examined under a compound microscope, that these were noticed. As a result, the distribution of the glands has been only partially determined (Table 3).

The wide variation in the use of terms descriptive of pubescence makes it desirable to attempt a redefinition and reapplication of most of these, at least for the purposes of this paper. It seems particularly desirable to distinguish between the "morphology" of the indument (i. e., the nature of the individual hairs and the way in which they are arranged) and the over-all effect of the pubescence. (See Constance 1949.)

In describing the morphology of the indument, six terms are most frequently used here. These indicate the approximate length of the trichomes and whether they are appressed or spreading. Strigillose, short-strigose and strigose designate appressed hairs, while the parallel series, hirtellous, hirsutulous and hirsute, indicates ascending or spreading hairs. There is, of course, no sharp line between the various lengths, but, as delimited below, these terms have proved to be of definite value.

Strigillose and *hirtellous:* with minute trichomes 0.1–0.5 mm. long.
Short-strigose and *hirsutulous:* with trichomes about 0.6–1.5 mm. long.
Strigose and *hirsute:* with trichomes more than 1.5 mm. long.
Tomentose: the indument dense, composed of relatively fine, twisted or tortuous hairs, somewhat tangled together and matted. This type occurs chiefly in *T. pachypoda*, *T. major*, *T. diversifolia* and *T. platyphylla*.
Villous: the indument of soft, often somewhat twisted, but not matted, spreading hairs more than 2 mm. long.

The terms sparse, thin, moderate and dense, although admittedly indefinite, have been employed to indicate the relative abundance of pubescence in connection with the terms above.

Such terms as sericeous (or silky), pilose, lanate (or woolly), velutinous (or velvety), shining, dull, canescent and soft are descriptive of the over-all effect of the pubescence and have been employed only in a supplementary descriptive capacity.

As a taxonomic character, pubescence was greatly over-emphasized by Rydberg, and this factor alone accounts for much of the difficulty in the use of his keys. In many species, the pubescence of the vegetative parts is either spreading or appressed and is of varying lengths. Several pubescence-types often occur within the same colony, yet some of these have been given specific or varietal rank. (See the accounts of *Tephrosia onobrychoides, T. spicata* and *T. virginiana.*) In some instances, however, the nature of the pubescence is a useful character in conjunction with other features of the plant. The retrorse hairs of *Tephrosia Thurberi* are, for example, correlated with very narrow, but deciduous, bracts and provide a valid criterion in the determination of fruiting specimens from which the bracts have fallen. In general, the indument of vegetative parts is variable and must be used with caution.

The pubescence of the legume and of the calyx is in some cases more stable. The length of the hairs on the ovary and legume provides a simple method for distinguishing *T. hispidula* from depauperate specimens of *T. florida. Tephrosia foliolosa,* a very poorly known species, is separable from *T. multifolia* by minute pubescence, all of one length, on the calyx. That of *T. multifolia* is double, both hirtellous and hirsutulous or strigillose and short-strigose.

Inflorescence.—The structure of the inflorescence is one of the most distinctive features of the genus. Inflorescences are characteristically "racemose" in appearance with the flowers either in 2's or, more commonly, in clusters or "fascicles" at one to fifty nodes. Each of these clusters is borne in the axil of a leaf or of a *primary bract* homologous with a leaf.[1] A cluster is composed

[1] The inflorescence of *Tephrosia Rugelii* shows varying degrees of the reduction of a multifoliolate leaf to a lanceolate bract. In this species, at least one and often as many as five flowering nodes of the inflorescence bear leaves. On some plants the lowermost of the leaves is an apparently normal vegetative leaf with from 9 to 15

of two to seven, or more, crowded flower buds, each of which is subtended at the base of the pedicel by a secondary bract.[1]

At least two of the buds at a node flower, while one or more may remain rudimentary. In the instances in which only two buds are present at a node, both of these flower simultaneously and anthesis proceeds centrifugally, as in *Tephrosia virginiana*, *T. Thurberi*, *T. leucantha* and *T. cuernavacana*. In those species in which 3 to 5 flowers are produced at each node, however, one of the lower buds on either side of the primary bract may open first, or both may flower together, to be followed by the third bud which lies directly behind the primary bract, and then by one or more others. In these species the flowering along the inflorescence-axis is more or less irregular, neither centrifugal nor centripetal, with the various nodes behaving somewhat independently of one another.

Although the inflorescences of many species are long and wand-like with well separated nodes, shortening occurs in varying degrees in some members of the genus. In *Tephrosia virginiana* and its allied species, the buds at a node are reduced to two plus a minute rudiment between them, and the nodes of the inflorescence are often very close together and strongly buttressed below. A similar extreme is encountered in *T. platyphylla* in which the inflorescences are very short and the buds few, while the leaflets are reduced to one or three. The inflorescence of *T. grandiflora* is composed of few flowering nodes (3 to 5), each with two functional buds and no external trace of the secondary bracts. The primary bracts are large, colored and deciduous.

The structure and flowering behavior of the inflorescence of the American species of *Tephrosia* lead to the conclusion that each cluster of buds in the axil of a primary bract or leaf represents an axillary branch-system in various degrees of reduction. Each

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leaflets. At successive nodes upward, however, the leaflet-number is reduced, eventually to a single, petiolate leaflet still with stipules at the base of the petiole. At still higher nodes the leaf and stipules sometimes appear as a deeply three-cleft bract. Eventually a single, lanceolate primary bract is found. Although all of these stages do not always occur, they do provide indications of reduction.

[1] Although the secondary bracts are in varying degrees smaller than the primary bract, in some instances the two outermost are nearly as conspicuous as the primary and may appear to be the stipules of the leaf represented by the primary bract. Cleared preparations, however, clearly show that the vascular traces of the secondary bracts are associated with those of the buds they subtend and not with those of the primary bracts.

"raceme" would then represent a complicated inflorescence, the component parts of which are more or less reduced and shortened.

The *position of the inflorescences* is usually constant in well-developed plants of a species. Three general types may be distinguished. Inflorescences may be (1) terminal or terminal and with shorter branches from the axils of the upper leaves, the terminal inflorescence being best-developed, (2) axillary or primarily so, with the axillary inflorescences first and best developed, or (3) apparently opposite the leaves and terminal (sympodial).

The first type is characteristic of 34 of the 49 species. Axillary inflorescences in this type are usually borne singly, although in *T. foliolosa* and *T. multifolia* two inflorescences are sometimes seen at one node. *Tephrosia multifolia* is somewhat doubtfully placed with this group, however, for although some specimens show well-developed terminal inflorescences, on most herbarium specimens the axillary inflorescences are evidently first and best developed.

Only axillary inflorescences are developed in *Tephrosia cuernavacana, T. Conzattii, T. lanata, T. crassifolia* and *T. bracteolata.* Both terminal and axillary inflorescences are sometimes developed in *T. rhodantha,* but the latter are usually first and best developed. These axillary inflorescences arise from one of the three buds which lie side-by-side in the axils perpendicular to the axis of the leaf. In *T. crassifolia* and *T. lanata* one or two short branches sometimes spring from near the base of an inflorescence or an inflorescence may be accompanied by one or two short inflorescences from the same axil.

The principal inflorescences of *Tephrosia rhodantha* and *T. bracteolata* are peculiar in that they emerge obliquely from the axils (i. e., from the side of the axil). The same type occurs in the otherwise very dissimilar **T. vicioides* Schlecht. The growth of one of the lateral buds in the axil does not seem to be responsible for this peculiar behavior, for in *T. Sinapou* and *T. Conzattii,* at least, some of the axillary inflorescences develop from one of the lateral buds, but in all cases emerge from the axil in the ordinary fashion.

In the third (sympodial) group of species, in which the inflorescences are apparently opposite the leaves or terminal, the inflorescences are actually terminal but may be overtopped by the

strong growth of an axillary branch which produces another terminal inflorescence and an axillary branch. This process may be repeated several times.

Although much has been made of the monopodial versus sympodial method of branching in *Tephrosia*, the distinction between the two is frequently finely drawn, with the additional complication of the two types of axillary inflorescences. It is, for example, frequently quite difficult to determine whether a plant of *Tephrosia onobrychoides* is monopodial or sympodial and this same difficulty is one of the limiting factors in the study of the glabrous-styled species. There is also the striking example of *T. Rugelii* which is monopodial in habit, but undoubtedly most closely related to species of the southeastern United States which are definitely sympodial. A further complication is the occurrence of oblique axillary inflorescences in very dissimilar species in the glabrous- and bearded-styled groups. Monopodial versus sympodial seems to be neither a very usable nor fundamental character within the genus as a whole.

Primary bracts may be either persistent or deciduous and vary from subulate or setaceous to broadly ovate or oval and inflated. These bracts are important taxonomic characters in some instances. Secondary bracts are usually smaller and narrower and are generally of little diagnostic importance.

Bracteoles are rarely present at the base of the calyx or on the pedicels but are regularly encountered in four very different species: *Tephrosia cana, T. diversifolia, T. Abbottiae* and *T. pogonocalyx.* One to three linear to subulate bracteoles may sometimes be found on the pedicels of *T. virginiana* and *T. Thurberi*, also.

Pedicels vary in thickness from one species to another, but characteristically elongate somewhat and thicken in fruit. Pedicel-length is a reliable character only in widely separated species.

Calyx.—The five-lobed calyx is persistent in all American species except **T. sessiliflora*, an anomalous plant in which the calyx is circumscissile at the base after anthesis. The upper lobes are usually shorter than the lowermost and are more or less united. Although in the past emphasis has been given to the length of the calyx-lobes and -tube, variation is found in the

length of the lobes within a species, so that care must be taken to include the full range. The length of calyx-lobes is, however, a useful character. Ratios of length of lobes to calyx-tube are variable, difficult of application and of little value, although the genus has been divided into subgenera partly on this basis (see Relationships). Shape of the lobes is relatively constant in most cases and furnishes an important taxonomic character.

Corolla.—All five petals of the papilionaceous corolla are clawed. The length of the claw is in some instances characteristic of a species. The banner is generally suborbicular to obovate and, in all of our species, more or less hairy on the back. A yellowish-green, apparently glandular area is present at the base of the blade within, but is frequently difficult to see in herbarium material and is seldom reported.

The wing-petals vary from oblong to obovate; the shape is not reliable. A small basal auricle is often present on the upper side of the blade near the base. The keel-petals, which are united at the outer end, may be with or without a basal auricle. For the purposes of corolla-measurement the keel is most satisfactory, for it is usually damaged least in drying and is relatively constant in length. Wings and keel are lightly coherent near the base of the blades; both are glabrous.

Corolla-color is seldom reported, but offers interesting possibilities. However, a tendency for a color-change to occur as the flowers age necessitates careful field-observation. Apparently in all of the species with a free vexillary stamen and in *T. onobrychoides* the corolla is white (or yellowish on the back of the banner), becoming pink and then carmine with age or violet in drying. The flowers of *T. leucantha* and *T. Thurberi* are white, becoming violet in age, while those of the related *T. virginiana* are bicolored with white or yellowish banner and rose wings and keel as, perhaps, are those of *T. nicaraguensis*. In contrast, the flowers of *T. Abbottiae* and three closely related species appear to be rose-purple, showing little or no change with age. The same is true of the peculiar pair of species, *T. Lindheimeri* and *T. potosina,* which have no evident close relatives. A number of other species show this same type of coloration. Data on specimens of *Tephrosia Sinapou* are confusing, but the few growing plants I have seen bore white flowers with violet markings on the

upper side of the wings near the base. The flowers of most of the glabrous-styled American species appear to be rose-purple or Liseran purple (Ridgeway) but at least one introduced species of this relationship seems to have white flowers.

Androecium.—The stamens are either monadelphous with the vexillary (uppermost) stamen free only at the base, or diadelphous with the vexillary stamen completely free from the other nine. This distinction is relatively constant and is usually observed without difficulty, although a few cases are somewhat dubious, mostly for lack of material (*Tephrosia madrensis, T. tepicana* and *T. bracteolata*). Interestingly enough, most of the relatively small group of diadelphous species (which have herbaceous habit and white flowers) seem to be rather closely related to each other, more so than to other members of the genus.

A more or less prominent, often two- or three-lobed thickening is frequently observed on the upper side of the vexillary stamen near the base. The margins of the staminal tube on either side of this callosity are also thickened, sometimes conspicuously so, as in *T. macrantha,* in which a knob-shaped structure is present.

Filaments and anthers are unappendaged. The anthers are uniform in size and arranged in two equal, alternating series, one above the other.

Gynoecium.—The sessile ovary is surrounded at the base within the staminal tube by a saucer- or collar-like disc characteristic of the Subtribe Tephrosiinae of the Tribe Galegeae. Four to sixteen ovules are borne along the upper suture, alternating ovules being attached to either valve. Ovule-number exhibits characteristic variations which are more or less clearly reflected in seed-number. There appears to be a tendency toward reduction in ovule-number in the genus. The 10 to 16 ovules of *T. rhodantha* distinguish it from other species of its group, while *T. Lindheimeri* and *T. potosina* at the other extreme bear but from 4 to 8. Among the smooth-styled species, **T. cinerea,* with from 10 to 12 (rarely as few as 8) ovules, is readily separated from other species, with 6 to 8.

The style may be glabrous or barbate with fine white hairs along the inner (upper) side. In all of the species with which this revision deals the style is more or less barbate. The glabrous-styled group includes all of the species with small

purple flowers, such as **T. cinerea*, **T. tenella* and **T. Senna*, as well as the very aberrant **T. sessiliflora.* In all species the stigma is terminal, small and penicillate. Tufts and rings of hairs are absent from the style.

Fruit.—In all of the American species, the two-valved, strongly dehiscent legume is essentially linear and most often nearly straight, although an upward or downward curvature is exhibited by several species. One to four pods are borne at a flowering node. Those of *T. macrantha* and *T. multifolia* characteristically droop, while all others are ascending or spreading. The persistent style-base forms distally on the upper side of the legume a more or less prominent beak which effectively distinguishes the legume of *Tephrosia* from the equally tapered pods of *Galega.* Pubescence, width and length of the legume and the number of seeds are the most useful characteristics, provided fully developed pods are chosen. Pubescence is, however, sometimes deceptive. A layer of elongated, thick-walled cells arranged diagonally below the epidermis gives the ripening legume the striate appearance remarked by Rydberg (1923) and apparently is responsible for the rupture of the ripe pod and the coiling of the valves.

Seeds.—The seed-coats of all of the indigenous species are smooth and usually of various shades of brown or gray, variegated with black. Two notable exceptions are the closely-related *T. Lindheimeri* and *T. potosina,* the seeds of which are buff or stramineous and unmarked. In the introduced species, **T. noctiflora,* the seed-coat is reddish brown and strongly wrinkled. The large, flat, black seeds of another introduced species, *T. Vogelii,* bear a conspicuous white caruncle, which is seen to a lesser degree in the related species, *T. candida.* In other species the caruncle is usually inconspicuous. Characteristic variations in seed-shape from subspherical to cylindric to compressed and more or less reniform in outline occur, but crowding within the pod strongly influences both shape and size. The subglobose seeds of *T. chrysophylla, T. florida* and *T. spicata* contrast markedly with the cylindrical seeds of **T. tenella* and **T. cinerea* or those of *T. Vogelii,* **T. noctiflora, T. Lindheimeri* or *T. potosina* mentioned above. Comments on the internal morphology of the seeds of several species have been published by Martin (1946).

Measurements

All measurements included in the descriptions of species have been taken directly from dried herbarium-material, with the exception of those involving flower-parts. The data relative to flower-parts are either from specimens preserved in alcohol or from flowers expanded by boiling. Length of the dried flower as encountered in herbarium-material has been indicated in most instances, but is not significant in more than a general way, since the petals (in particular the banner) often crumple or shrink in drying.

Length of the *inflorescence* includes the peduncle between the lowermost flowering node and the next lower leaf. In most instances the length of the peduncle is noted separately as well.

Calyx-length has been measured in all instances along the upper side from the receptacle to the tips of the upper lobes. Length of the calyx-tube, where indicated, is measured between the upper and lateral lobes. The upper calyx-lobes are measured from the base of the sinus between them to the tips of the lobes. *All measurements of calyx-parts have been made from flowers at anthesis.* The relative proportions of the lobes, as well as their shape and length, change from bud to flower and from flower to fruit.

Length of the blade of the *banner* and of the claw are given separately since the banner is strongly reflexed, making measurement difficult. All measurements of *wings* and *keel-petals* include the claw, however. The keel is measured from the proximal tip of the claw to the apex of the keel.

The *staminal tube* has been measured along the lower side and does not include the full length of the stamens.

Length of the *legume* does not include the persistent base of the style which, in most instances, forms a beak on the upper side.

Relationships

Tephrosia, in the sense used in this paper, is a natural genus defined on the basis of a number of characters. These include the collar-like disc surrounding the base of the ovary, the imparipinnate leaves, the simple trichomes, the terminal penicillate stigma, the unappendaged equal anthers, the pubescent back of the banner, the wings slightly coherent with the obtuse keel, the

absence of stipels, the peculiar inflorescence and the apparently uniform occurrence of 11 pairs of chromosomes. Some of these characters are shared in various combinations with presumably related genera, but others, such as inflorescence and chromosomes, set the genus apart.

Although various relationships have been assigned to *Tephrosia* within the Tribe Galegeae, this question is badly in need of critical examination in terms of the whole plant, a project far beyond my present scope. In order to give a general idea of likely relationships, however, it may be noted that Taubert (1894) placed *Tephrosia* in the Subtribe Tephrosiinae along with *Galega* L., *Ptychosema* Benth., *Sylitra* E. Mey., *Mundulea* DC., *Millettia* Wight & Arn., *Wisteria* Nutt., *Fordia* Hemsl., *Sarcodum* Lour., *Platysepalum* Welw., *Poecilanthe* Benth., *Chadsia* Boj., *Barbieria* DC., *Peteria* A. Gray, *Poissonia* Baill. and *Bolusia* Benth.

Rydberg (1923a), considering the North American representatives of this group, divided the Tephrosiinae into two subtribes, the Craccanae, including *Galega*, *Cracca* L. (= *Tephrosia*) and *Peteria*, and the Millettianae with *Kraunhia* Raf. (= *Wisteria*). The general reliability of this bit of classification may be judged by Rydberg's statement regarding *Barbieria* which he placed in a subtribe of its own considerably removed from the Craccanae and Milletianae: "The Tephrosieae of Bentham (Tephrosiinae of Taubert) is in itself not a natural division, for *Barbiera* is not at all closely related to the rest, being distinguished by the long-clawed petals, the presence of 2 bractlets beneath the tubular calyx, and the style bearded along the upper side." This general idea may possibly be true, but the evidence presented is hardly convincing, for there are 45 endemic American species of *Tephrosia* with bearded styles and 4 of these bear bracteoles on calyx or pedicels.

Tephrosia itself has been variously divided into sections, but until much more of the Old World material can be examined it seems neither feasible nor wise to attempt to establish further formal subgeneric groups, although it is certain that a realignment will be necessary. It may, nevertheless, be worthwhile to indicate some of the possible subdivisions.

It appears to me that two principal divisions within the genus must be based on glabrous styles versus barbate styles. Although this may seem to be an arbitrary division based on a single character, it is perhaps the same type of distinction as the presence or absence of chaff or bristles on the receptacle of the Compositae which sets off large and presumably related groups of genera. Such a split in *Tephrosia* is apparently fundamental within the New World species, at least, as is borne out by related species which lead from one small group of species to another (although there are gaps). In general, the two series are composed of very different species and parallel series are not found in the two divisions, although such features as unifoliolate leaves, sympodial branching, oblique axillary inflorescences and similar flower-color may appear in otherwise quite dissimilar species.

It may also prove desirable to recognize a small, closely knit barbistyled group of species of southern Africa which includes *Tephrosia grandiflora* and its allies with large stipules and ovate, spathaceous primary bracts. Secondary bracts are completely absent. This alliance has been designated Section *Apodynomene* (E. Mey.) Harvey, Fl. Capensis **2**: 203. 1861.

There are at least two other small groups which are probably not worth recognition, but with which I am poorly acquainted. These are the sections (or genera) *Pogonostigma* and *Requienia* which include a few African species with 1-seeded fruits. The leaves of the first are compound, those of the second unifoliolate. Should these prove to be worthy of the sectional rank assigned them by Taubert, the remainder of the genus may well be designated *Eutephrosia* Harvey, Fl. Capensis **2**: 203. 1861.

The main body of the genus (*Eutephrosia,* including both barbate- and glabrous-styled species) has customarily been divided since the time of DeCandolle into the Sections *Brissonia* (Moench) DC. and *Reineria* (Neck.) DC., but these are artificial groups based upon a combination of habit (monopodial vs. sympodial) and the ratio of length of calyx-lobes to -tube, characters which are not necessarily correlated with one-another. (See MORPHOLOGY: *Habit, Calyx* and *Inflorescence;* also Rydberg 1923a.) Rydberg (1923) established 17 small, completely new sections for the North American species, but some of these are

manifestly artificial and none can be rearranged or retained satisfactorily in terms of the whole genus.

Although it would be gratifying to be able to set down a chart showing the phylogeny of the American barbistyled species, the interrelationships of these plants are far from clear. Some small groups or pairs of species are clearly related to each other, and the group as a whole may be divided into two main complexes, but even after this there are a number of species apparently not very closely related to each other or to any of the small groups. The interrelationships of the latter are not very clear, either.

It must, as a result, suffice to point out that the American species fall into two principal series. The plants of the first series (A) (including Species 1 to 23) possess thin leaflets bearing stomata in the upper epidermis. The areoles between the principal parallel lateral veins are distinctly elongate. The second series (B) (Species 24 to 45) includes species with either thin or very coriaceous leaflets, generally with nearly isodiametric areoles between the lateral veins of the leaflets, and usually with few or no stomata in the upper epidermis. A strong tendency toward reduction in the number of leaflets is encountered in this series and the flowers of most of the species seem to be rose-purple.

Within Series A, two distinct subdivisions may be recognized, according to the coherence of the vexillary stamen with the staminal tube. In five closely related species of the southeastern United States, in the two species occurring in Baja California, in *Tephrosia tepicana* and in *T. madrensis* from the Sierra Madre of Sinaloa and Nayarit, Mexico, and in the more widespread *T. rhodantha*, the vexillary stamen is completely free from the staminal tube, even in the smallest buds (Species 12 to 21; see Key 2). These are all herbaceous, white-flowered species which exhibit a tendency toward reduction in leaflet-number. In the remainder of the species of Series A, the vexillary stamen is coherent with the staminal tube, although free at the base. This subdivision embraces both woody and herbaceous types. The basic flower-color appears to be white, although at least *T. virginiana* has bicolored flowers and *T. potosina* and *T. Lindheimeri*, placed here although apparently not closely connected with any of the other American species, bear rose-purple flowers. A possible connecting link between the two groups of Series A is

found in the white-flowered *T. onobrychoides* of the Gulf Coastal Plain of the United States, which approaches the southeastern species in habit and general appearance but in which the vexillary stamen is fused with the staminal tube.

Various exceptions to the general characters distinguishing the two principal groups will be noted in Table 3. Within Series A the areoles of the leaflets of *T. tepicana* and *T. madrensis* are distinctly isodiametric, although stomata are present in the upper epidermis of at least the former. The material of these two is very scanty but the vexillary stamen appears to be free, thus linking them with similar members of this group. Conversely, the areoles of *T. Pringlei* of Series B are conspicuously elongate and stomata are invariably present in the upper epidermis of the leaflets, but this plant is otherwise allied to *T. Seemannii* and *T. saxicola*. Similarly, the areoles of *T. nitens* are elongate and those of a number of other species of this group are more or less intermediate in shape, although other characters clearly link them with this assemblage.

The relationships of various pairs or small groups of species, in addition to those already mentioned, are brought out in the discussions of individual species. A branching system of relationships or a brush-heap structure would undoubtedly be far more satisfactory than the linear sequence which must necessarily be used, for I suspect that woody types of Series A with relatively many leaflets and flowers at a node, such as *T. multifolia* and *T. Sinapou*, have led to more specialized forms, such as *T. virginiana*, *T. Conzattii* and *T. leiocarpa*, and have led as well to those with a free vexillary stamen and to Series B. I have, however, tried to show in their linear arrangement such relationships as seem to be indicated by the morphological features of the plants.

Distribution and Ecology

The barbistyled Tephrosias are primarily North American in their distribution in the New World, with only *Tephrosia Sinapou* and *T. nitens* extending into South America. Outline Maps 1 to 20 indicate the distribution of individual species in North America, and this information is summarized in the accompanying Generalized Distribution Map. Such a generalized map can only indicate the total number of species known to occur in a

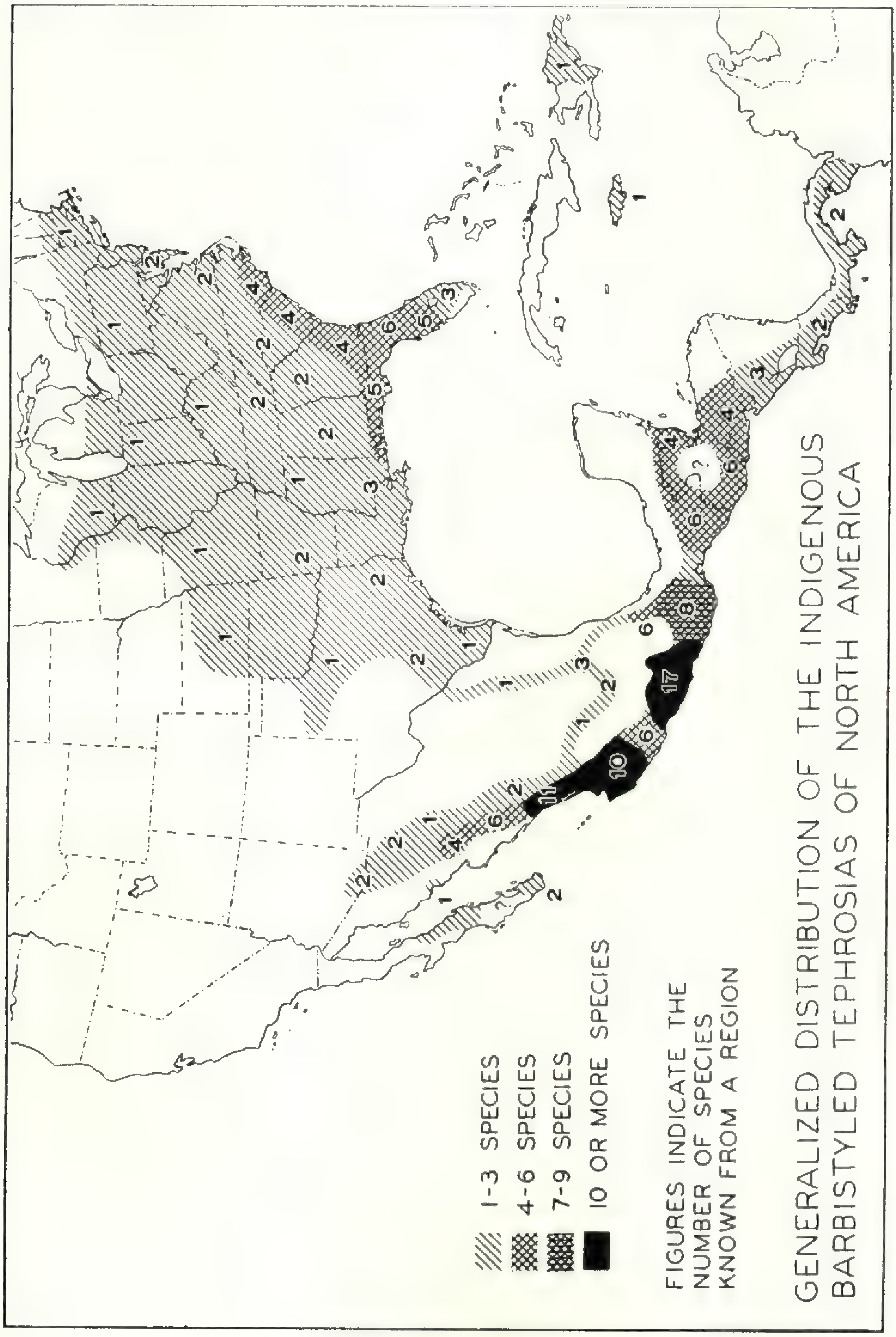
given region, since it is obvious that no two species will have the same range and that distributions will overlap in varying degrees. In addition, the number of species from some areas may be expected to change as our knowledge of Mexico and Central America increases and new species are discovered. Nevertheless, it will be seen immediately that the chief diversity of the barbistyled group is in the mountains of southwestern Mexico,[1] particularly in the region from southern Sinaloa to Guerrero and Morelos (areas in solid black on the map). Twenty-seven of the 45 species are known to occur in this territory and 20 of these are endemic to this area.

Within this region of concentration of species, two divisions apparently exist: a northern part consisting of southern Sinaloa, Nayarit and western Jalisco separated by Michoacán from a southern area including Guerrero, southern México[1] and Morelos. This southern region is in turn subdivided by the lowlands of the Río Balsas into a northern portion (southern México, Morelos and northern Guerrero) and a southern portion (the remainder of Guerrero south of the Río Balsas). Eleven barbistyled species of *Tephrosia* are known from each of these areas and a total of 17 from the two together. The decrease in concentration represented by Michoacán with only 6 species may be more apparent than real since much of the western part of the state which may be expected to harbor Tephrosias is as yet largely unknown botanically and otherwise.

Outside this rich band of mountainous country with 27 species the number of species declines rapidly, although some endemism is still evident, for only a few types are really widespread, extending from various parts of Mexico varying distances into Central or South America. These widespread species include *Tephrosia nicaraguensis, T. multifolia, T. nitens, T. Sinapou* and *T. rhodantha.*

Of the eight species known from Oaxaca, only one (*T. Pringlei*) is confined entirely to that state. The others are shared to the north, west or east. One type of distribution also seen in other genera is exemplified by *T. Conzattii,* represented from Oaxaca, Guerrero and southern México, and another in *T. Langlassei,*

[1] In order to distinguish between the Republic of México and the State of México, the English spelling is used throughout for the republic and the accented Mexican form for the state.



GENERALIZED DISTRIBUTION OF THE INDIGENOUS BARBISTYLED TEPHROSIAS OF NORTH AMERICA

which extends both north and west and then southward into Chiapas. Still another distribution is that of *T. belizensis*, reaching from Veracruz across the northern side of Oaxaca into Chiapas and British Honduras. In Veracruz, *T. lanata*, in addition to *T. belizensis* and *T. Langlassei*, extends along the slopes of the eastern sierra southward and eastward; the other three species occurring in Veracruz are widespread.

Guatemala can claim at present only one endemic species, and that an undescribed, distinct but sterile plant collected by Steyermark in the Department of Huehuetanango (see Species 21). The other six species (the undescribed plant was omitted from the generalized map) include five widely distributed types and *T. lanata*. Southward from Guatemala the number of species decreases and only *T. multifolia* and *T. nitens* are known to reach Panama. It is strange that *T. Sinapou* has not been collected beyond El Salvador, for it has a wide distribution in South America and appears in the West Indies.

No collections of *Tephrosia* are known to me from Hidalgo, Puebla, Aguascalientes, the higher parts of México, and most of eastern and northern Jalisco and Michoacán, although two species reach the northern side of this area in the oak forests of Guanajuato and Querétaro, and one extends northward again to a corner of Tamaulipas.

Eleven barbistyled Tephrosias occur in the United States. *Tephrosia leiocarpa* and *T. Thurberi* reach the mountains of southern Arizona and *T. potosina* extends from San Luis Potosí into Texas, where its range meets that of the related *T. Lindheimeri*. This last species has not yet been collected in Mexico but is not uncommon in southern Texas to the Mexican border at the Río Grande.

The most widely distributed species in the United States is *Tephrosia virginiana*, which is found from New Hampshire to Wisconsin and south to Florida and western Texas. *Tephrosia onobrychoides* occupies a part of the Mississippi embayment of the Gulf Coastal Plain. The remaining five species, all plants with the vexillary stamen free, radiate more or less concentrically northward from central peninsular Florida, with *T. Rugelii* occupying the smallest and *T. spicata* the largest area, the latter extending well off the Coastal Plain. Plants presumably most

closely related to these five species occur in Baja California, western and southern Mexico, and Guatemala.

Each of these present-day distributional patterns is, of course, delimited by the area covered by the particular set of environmental conditions to which that species is attuned. Each distribution must also reflect to some degree both the history of the species and geological history. Presumably, most of these species already occupy the suitable habitats now available to them and are prevented by unfavorable environmental conditions from expanding their ranges farther. An attempt to explain distributions with only the present data from which to judge would be both premature and unwarranted, but a number of coincidences are strikingly suggestive and worth underscoring.

Although ecological notes concerning many species of Mexico and Central America are scanty or lacking altogether, it is evident that the majority of the Mexican species are confined to well-drained soils in open oak and/or pine forests in non-calcareous areas mostly below 2300 m. (ca. 7500 feet). Exceptions are found in relatively wide-ranging species such as *T. multifolia*, *T. rhodantha* and *T. nitens*, which may occur outside the oak-pine forests in open areas at low altitudes, and in *T. leucantha* of oak and pine forests southward from northwestern Chihuahua to Guanajuato and Querétaro, where it may be found at 2500 m. (8000 feet). It may be significant that the greatest diversity of the barbistyled group is in mountainous regions in which rain is lacking during winter and spring and the winters themselves are warm.

Part of the absence of the genus from Hidalgo, Puebla, Aguascalientes, eastern and northern Jalisco and Michoacán and the higher parts of México (assuming that this absence is real and not due to insufficient collecting) may be attributed to semi-desert conditions which occupy a portion of this expanse. In Hidalgo, where extensive search has failed to reveal a single species of *Tephrosia*, it is perhaps significant that oak and pine forests where Tephrosias might be expected to occur are primarily on soils of calcareous derivation, whereas apparently non-calcareous soils are the rule in those parts of Mexico where numerous species have been collected.

In the United States *Tephrosia virginiana, T. onobrychoides* and the five species of the southeastern states are always found in open habitats in non-calcareous soils. All of the stations of *T. onobrychoides* appear to occur on well-drained, leached, sandy, acid, non-calcareous red and yellow podzolic soils of the Norfolk-Ruston, Caddo-Beauregard, Hockley-Katy, Lake Charles-Crawley and Hanceville-Conway series and the species disappears abruptly when the black prairie and other Rendzina soils of the Houston-Austin-Denton and Victoria-Goliad series (derived from marls, chalks and calcareous clays) (U. S. Dept. Agr. 1938) are reached. This coincidence suggests that at the western edge of the range edaphic factors may be limiting, but that other factors at various other points on the periphery of the species may also be limiting, for suitable Norfolk-Ruston soils are widely distributed around the Coastal Plain to Virginia.

Tephrosia Rugelii, T. chrysophylla, T. florida, T. hispidula and *T. spicata,* of the southeastern United States, all occur on sandy soils of the Coastal Plain; the first four are completely restricted to that area, but *T. spicata* extends into well-drained sandy and sand-clay soils over a wider area. *Tephrosia Rugelii* occupies the smallest expanse, being found on sands of the Leon-Bladen and Norfolk-Blanton soils primarily in oak barrens in the flatwoods regions of central peninsular Florida. *Tephrosia chrysophylla* grows prostrate on open white sand in dry oak barrens over a larger range, while *T. florida* occupies a still larger area, always on sandy, but often somewhat more shaded and moister soils. An extreme is reached in *T. hispidula* which is distributed primarily in the grassy and sedgy pine flatwoods along the Atlantic Coastal Plain in sandy soils of the Leon-Bladen and Coxville-Portsmouth-Bladen groups, which may be moist or even wet, in contrast to all the other species with which I am acquainted.

With all of these species the circumstantial evidence strongly suggests that edaphic factors are important in determining distribution. *Tephrosia florida* is, for example, very abundant on the Norfolk sand in Richmond County, North Carolina, in the northern part of its range, but disappears along with the long-leaf pine (*Pinus australis* Michx. f.) as the abrupt transition to the heavier Georgeville-Alamance soils occurs. As was indicated previously, almost all of the barbistyled species are known on

soils of non-calcareous derivation, although some of the glabrous-styled species (as **T. cinerea*) may grow directly on limestone outcrops. The only exceptions of which I am aware are *T. potosina* and *T. Lindheimeri* which, to judge from notes on various herbarium-specimens, may sometimes occur on calcareous soils.

It seems likely, too, that the isolating mechanisms between some of the species of *Tephrosia* are at least partially ecological. As was noted above, *Tephrosia chrysophylla* usually occurs in drier and more open habitats than those occupied by *T. florida*. Occasionally, however, the two species occur together and I have found intermediate plants, presumably hybrids (see Species 19a) only in such localities. Similarly, intermediates (inconclusively hybrids) were found along a road-bank where *T. spicata* grew at the edge of brush and *T. chrysophylla* on the exposed white sand. Another suggestive but inconclusive example was seen in Emanuel County, Georgia. Here *Tephrosia florida* was abundant in open ground between trees of *Quercus incana* Bartr. and *Q. alba* L., while *Tephrosia hispidula* grew in moister, sedgy ground with pines. In a narrow zone of gradation between these habitats plants morphologically intermediate between these two distinct species occurred. Except at this locality, I have never found *T. florida* and *T. hispidula* in contact with one another.

(*To be continued*)

THE WHITE FORM OF ASTER PUNICEUS, VAR. FIRMUS.—In RHODORA **51:** 95. 1949, Prof. Fernald implies that *Aster puniceus* L., forma *albiflorus* R. Hoffm. is the correct name for the albino of *A. puniceus*, var. *firmus* (Nees) T. & G. Unfortunately, however, this name is illegitimate according to Article 30 of the International Rules, which states that two subdivisions of the same species, even if they are of different rank, cannot bear the same subdivisional epithet, unless they are based on the same type.

A. puniceus, var. *lucidulus* Gray, forma *albiflorus* R. Hoffm. in Proc. Bost. Soc. Nat. Hist. **36:** 339. 1922 is antedated by the same epithet, based on a different type, published as *A. puniceus*, var. *albiflorus* Farwell in Rep. Mich. Acad. Sci. **17:** 171. 1916. This proves to be, as shown by Prof. Fernald, the albino form of typical *A. puniceus* L. He also shows that *A. puniceus*, f. *albi-*

florus (Farwell) Shinners in Am. Midl. Nat. **26:** 414. 1941 is made illegitimate by the prior publication of f. *albiflorus* R. Hoffm. Accordingly, he describes the new form, *A. puniceus* L., forma *candidus* Fernald l. c., of which the two ternary combinations based on Farwell's type become facultative synonyms.

This curious application of the rules, whereby three names, based on two different types, cancel each other out and are made unavailable, makes it necessary to create a name for the albino of *A. puniceus*, var. *firmus* (Nees) T. & G.

Aster puniceus L., var. firmus (Nees) T. & G., forma **etiamalbus,** nom. nov. *A. puniceus*, var. *lucidulus*, f. *albiflorus* R. Hoffm. in Proc. Bost. Soc. Nat. Hist. **36:** 339. 1922, non *A. puniceus*, var. *albiflorus* Farwell in Rep. Mich. Acad. Sci. **17:** 171. 1916. —Haskell Venard, Atlanta, Georgia.

Basicladia in Maine.—In November, 1948, a common musk-turtle, *Sternotherus odoratus* (Latreille), was captured in Pushaw Stream in Old Town, Penobscot Co., Maine. This turtle bore a growth of alga on the marginal plates of the carapace and on the dorsal surface of the beak. The alga was identified by Dr. E. C. Ogden of the University of Maine as *Basicladia chelonum* (Collins) Hoffmann and Tilden. The turtle has been turned over to Dr. A. H. Gustafson of Bowdoin College for further study, in the hope that fruiting bodies of the alga may be found, as the literature indicates that such structures are as yet undescribed.

An examination of the literature indicates no previous record of this genus from Maine. In fact, no record was found from any New England state other than Massachusetts. Smith[1] cites *Basicladia* from Massachusetts, Michigan, Minnesota, and Iowa. It does not seem reasonable that these scattered reports are indicative of true distribution and frequency of the alga. *Basicladia* has been found only on turtles, both those which spend almost all their life in the water, such as the musk-turtle, and those which have the "sunning" habit, as do the painted turtles. It is likely that an examination of more turtles will bring to light many new records for this alga.—R. M. Chute, Stillwater, Maine.

[1] Smith, G. M., The Fresh-water Algae of the United States, p. 432 (1933).

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CONTENTS:

Contributions from the Gray Herbarium of Harvard University — No. CLXX. The American Barbistyled Species of Tephrosia (Leguminosae). *Carroll E. Wood, Jr.* 233

Campanula Rentonae, sp. nov. *Robert M. Senior.* 302

Helenium Curtisii in Virginia. *J. T. Baldwin, Jr.* 303

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—No. CLXX

THE AMERICAN BARBISTYLED SPECIES OF TEPHROSIA (LEGUMINOSAE)

Carroll E. Wood, Jr.

(*Continued from page 231*)

Systematic Treatment

The generic description given below is based on the specimens examined in the course of this study and includes both groups of the New World species. It does not entirely apply to a number of species of the Eastern Hemisphere.

In the treatment of individual species the type-collections or -localities of names are included with the synonymy. Types and isotypes which have been examined are indicated by the herbaria in which they are deposited.

TEPHROSIA Pers.

Cracca L. Sp. Pl. 752. 1753, not Medic. 1789, nor Benth. 1853. Type-species: *C. purpurea* L.

Colinil Adans. Fam. **2:** 327. 1763. Substitute name.

Tephrosia Pers. Syn. Pl. **2:** 328. 1807. *Nomen conservandum.* Type-species: *T. villosa* (L.) Pers. not (Michx.) Pers.

Kiesera Reinw. Syll. Ratisbonn. **2:** 11. 1828. Type-species: *K. sericea* Reinw. (= *Tephrosia candida* DC.).

Xiphocarpus C. Presl, Symb. Bot. **1:** 13. pl. 7. 1830. Type-species: *X. martinicensis* Presl (= *Tephrosia candida* DC. introduced into Martinique).

Apodynomene E. Mey. Comment. Pl. Afr. Austr. 111. 1835. Type-species: *A. grandiflora* (L'Her. ex Ait.) E. Mey. based on *Tephrosia grandiflora* (L'Her. ex Ait.) Pers.

Balboa Liebm. (Type-species: *B. diversifolia* Liebm.) and *Crafordia* Raf. (Type-species: *C. bracteata* Raf.) usually assigned to this synonymy are not *Tephrosia*. See Excluded Species.

Erect, decumbent or prostrate perennial herbs or shrubs, usually from a woody crown and heavy woody roots, many species producing rotenone and related compounds. Stems branching either monopodially or sympodially. Pubescence primarily of simple, bicellular hairs 0.1–3 mm. long, these straight, twisted or curling. Minute, flattened 8–10-celled clavate glands of a single layer of cells sometimes present. Leaves 1–41-foliolate, the rachis and sometimes the petioles channeled on the upper side; stipules present, persistent or caducous, usually herbaceous, rarely rigid or spinescent; leaflets petiolulate, estipellate, usually with prominent, nearly parallel veins given off obliquely from the midrib, variously reticulate between; the upper epidermis with or without stomata, glabrous or hairy, the lower surface always with hairs. Inflorescences terminal, axillary or apparently opposite the leaves, in the last actually terminal but overtopped by an axillary branch which may bear a terminal raceme and another axillary branch, a process which may be repeated several times; axillary inflorescences 1–3 from an axil, sometimes obliquely inserted; inflorescences pseudo-racemose, with the flowers in clusters or fascicles at 1 to many nodes, each node with a leaf or primary bract and each of the (2–)3–10 flower-buds with a secondary bract at the base of the pedicel (except in *T. grandiflora*), the bracts persistent or caducous; at least two flower-buds developing and flowering, one or more usually rudimentary; bracteoles on calyx or pedicels usually absent, but present in a few species. Calyx persistent (or circumscissile at the base after anthesis in **T. sessiliflora*), 5-lobed, the lobes usually unequal, the upper pair more or less united and shortest, the lowermost lobe longest. Petals clawed; blade of the banner more or less orbicular, hairy on the back, often sericeous; the wings lightly coherent with the glabrous keel-petals near the base of the blade; wings and keel-petals with or without a small basal auricle on the upper side; keel usually obtuse, not beaked, or only slightly so. Stamens monadelphous, the filaments connate in a glabrous tube with the vexillary stamen free at the base, or diadelphous with the vexillary stamen completely free; anthers uniform, in two series, unappendaged. Ovary sessile, 4–16-ovulate, surrounded at the base by a collar-like disc within the staminal tube; style glabrous or barbate on the upper (inner) side. Legume sessile, linear, straight or slightly curved, usually compressed, 2-valved, not partitioned between the seeds within, obliquely contracted distally and beaked on the upper side by the persistent style-base; sub-epidermal layer of cells thick-walled and elongate, arranged obliquely, the valves often cracking along these lines at maturity and appearing striate; seeds subglobose to cylindrical or compressed and oblong-reniform in outline, estrophiolate. Somatic chromosomes 22.

Distribution. Several hundred species widespread in warm-temperate and tropical regions of both hemispheres, especially in Africa, North America and Australia; absent from Europe.

Artificial Key to the Species

(This key is based primarily on flowering material. For terminology and methods of measurement see Morphology and Taxonomic Criteria and Measurements.)

A. Style barbate.

B. Ovary glabrous on the valves, strigillose along one or both sutures; legume hirtellous to strigillose along the sutures or completely glabrous. .... Key 1

B. Ovary pubescent; legume hairy: hirtellous or strigillose to strigose, hirsute, villous or tomentose.

C. Vexillary stamen completely free from the staminal tube..... Key 2

C. Vexillary stamen united with the tube but free at the base.

D. Staminal tube 18 mm. or more long; keel 21–34 mm. long... Key 3

D. Staminal tube 10–15 mm. long; keel 10–19(–20) mm. long.

E. Undersurfaces of the leaflets densely tomentose; leaflets large and coriaceous, usually blunt, 1–11; racemes terminal and axillary.......... Key 4

E. Undersurfaces of the leaflets variously hairy, but not densely tomentose with tortuous, tangled hairs; leaflets 1–41... Key 5

A. Style glabrous. . . See list of species excluded on this character.

Key 1

Ovary glabrous on the valves, strigillose along one or both sutures; legume hirtellous to strigillose along the sutures or completely glabrous.

a. Inflorescences axillary, the lowermost first and best developed; monopodial....*b.*

b. Primary bracts lanceolate to ovate-lanceolate, acuminate, deciduous; leaflets 13–29; rachis 4–11 cm. long; buds and flowers 2 at a node..........7. *T. cuernavacana*

b. Primary bracts linear-subulate to linear-setaceous, sometimes persistent; leaflets 15–37; rachis 4–16 cm. long; buds 5–7 at a node..........6. *T. Conzattii*

a. Inflorescences terminal and axillary or apparently opposite the leaves....*c.*

c. Primary bracts persistent....*d.*

d. Leaves unifoliolate; inflorescences terminal and axillary. ....21. *T. madrensis*

d. Leaflets 9–17; plant sympodial, the inflorescences opposite the leaves..........16. *T. spicata*

c. Primary bracts deciduous....*e.*

e. Stipules ovate, acuminate, reddish or brownish, persistent; leaflets 9–15; primary bracts large, broadly ovate, acuminate, inflated, reddish, deciduous; legume 9–16-seeded; Jamaica..........46. *T. grandiflora*

e. Stipules linear-setaceous to linear or lanceolate, green to brownish; leaflets 9–23(–27), linear-oblong to oblong-oblanceolate or elliptic, strigillose beneath; rachis 2.3–7.2 cm. long; primary bracts linear-setaceous, deciduous; legume 6–11-seeded; Arizona, Sonora, Chihuahua and Jalisco..........5. *T. leiocarpa*

Key 2

Vexillary stamen completely free from the staminal tube.

a. Inflorescences terminal and/or axillary, the latter first and best developed and inserted obliquely in the axils, leafless; leaflets principally 11–21....*b.*

b. Leaflets linear, 2–6 cm. long, 2–4 mm. wide; calyx 2 mm. long; introduced into Hispaniola..........49. *T. bracteolata*

b. Leaflets narrowly elliptic to linear-oblong or elliptic, 1–3.2 cm. long, (3–)4–10 mm. wide; calyx 3.5–6 mm. long; ovules ca. 15; Mexico to Guatemala . . . . 12. *T. rhodantha*

a. Inflorescences terminal or apparently opposite the leaves or, if axillary, not obliquely inserted . . . . *c.*

c. Inflorescences terminating the principal or axillary leafy branches; flower buds 2–3 at a node; bracts usually deciduous; one or more nodes of inflorescence with leaves; leaflets 3–17, uniform, obovate to narrowly cuneate; peninsular Florida . . . . 15. *T. Rugelii*

c. Inflorescences generally leafless, or occasionally 1 flowering node with a leaf; bracts persistent, except in *T. cana* . . . . *d.*

d. Legume hirtellous or strigillose with hairs 0.2–0.5 mm. long; ovary strigillose with minute hairs . . . . *e.*

e. Calyx or pedicels with 2 bracteoles; inflorescence congested; calyx densely hairy with white hairs; legume 4–7 cm. long, 4–5 mm. wide, hirtellous; leaflets 7–23; Baja California . . . . 13. *T. cana*

e. Calyx and pedicels without bracteoles . . . . *f.*

f. Leaflets linear to linear-oblanceolate, 9–45 mm. long, 2–7 mm. wide, 5–13, mostly 9 in number; stipules triangular-lanceolate to subulate, rigid; pubescence of plant white, silvery, tightly appressed; Baja California and Sonora . . . . 14. *T. Palmeri*

f. Leaflets elliptic or elliptic-oblong, elliptic-oblong to lanceolate or cuneate to obovate . . . . *g.*

g. Leaves unifoliolate . . . . 21. *T. madrensis*

g. Leaves (3–)5–19-foliolate . . . . *h.*

h. Leaflets 5–11, the upper leaflets of a leaf 3–6 cm. long, 1.3–3 cm. wide, elliptic-oblong to lanceolate, rounded or subcordate at the base, the margins ciliate; flowering nodes 3–18; primary bracts linear-subulate; Sinaloa and Nayarit . . . . 20. *T. tepicana*

h. Leaflets (3–)5–19, cuneate to obovate, the terminal leaflet 8–35 mm. long, 6–20 mm. wide, or narrowly cuneate to elliptic, 1.8–5.2 cm. long, 2–3 mm. wide; southeastern United States . . . . *i.*

i. Stem and leaves prostrate; leaflets primarily 5–7 (rarely 9–11), coriaceous, shining, cuneate to narrowly obovate-cuneate; petioles 1–5(–7) mm. long, 1/3 or less the length of the lowermost leaflet (including petiolule); inflorescences prostrate . . . . 19. *T. chrysophylla*

i. Stem prostrate, decumbent or erect; leaflets primarily 7–19, if fewer, the terminal more than 30 mm. long; petioles mostly more than 1/3 the length of the lowermost leaflets . . . . *j.*

j. Petioles of some or all of the principal leaves 0.3–9.5 cm. long, 1–4 times the length of the lowermost leaflets (including the petiolules), or if less, the stems erect or decumbent; leaflets 7–19 . . . . 18. *T. florida*

j. Petioles of the principal leaves 0.5–1 cm. long, some or all 1/3–7/9(–1) times the length of the lowermost leaflets (including

the petiolules); stems prostrate; leaves prostrate, ascending or erect; leaflets 7–13, predominantly 9. .19a. *T. chrysophylla* × *T. florida*

d. Legume short-strigose to strigose or hirsutulous to hirsute on the valves; ovary short-strigose to strigose; axis of inflorescence generally not flattened. . . . *k.*

k. Leaflets 5–13, mostly 9, linear to linear-oblanceolate, 9–45 mm. long, 2–7 mm. wide; stipules triangular-lanceolate to subulate, rigid; pubescence of plant white, silvery, tightly appressed; legume 6.5–7 cm. long, 3–4 mm. in diameter, densely strigillose to short-strigose or hirtellous to hirsutulous with white hairs usually less than 0.8 mm. long, 12–16-seeded; Baja California and Sonora. . . . . 14. *T. Palmeri*

k. Leaflets 9–23, not linear or linear-oblanceolate; pubescence generally partially yellowish or rusty, that of the legume spreading; legume 3–6.5 cm. long, 4.5–6 mm. broad; southeastern United States. . . . *l.*

l. Leaflets principally 9–17, oblong-obovate to obovate, elliptic or oblong-elliptic, 11–27 mm. long, 6–13 mm. broad; inflorescences 4–45 cm. long; flowering nodes 2–20; pedicels stout; calyx 6–7 mm. long, the lobes deltoid to lanceolate, long-acuminate, the upper 2.5–5 mm. long, the lateral 3–5 mm. long, the lowermost 4–6 mm. long. . . . . 16. *T. spicata*

l. Leaflets principally 13–19, oblong to ovate-lanceolate or narrowly elliptic, 7–22 mm. long, 2–7 mm. broad; inflorescences 1.5–15 cm. long; flowering nodes 1–3(–5); pedicels almost filiform in flower; calyx 3–4 mm. long, the upper and lateral lobes deltoid, abruptly contracted near the tip, 1.5–2.5 mm. and 1.5–3 mm. long, respectively. . . . . 17. *T. hispidula*

KEY 3

Staminal tube 18 mm. or more long; keel 21–34 mm. long.

a. Leaflets of the principal leaves 3–11. . . . *b.*

b. Leaflets 3–7, oblanceolate, principally 2–7.5 cm. long; lateral and lowermost calyx-lobes triangular, subulate, 6–7 mm. long; Sinaloa. . . . . 30. *T. hypoleuca*

b. Leaflets 7–11, narrowly elliptic-oblong or occasionally lanceolate-oblong, 3–7.3 cm. long; calyx 14–16 mm. long, densely villous, the upper lobes 3–8 mm. long, the lateral and lowermost lanceolate or ovate-lanceolate, acuminate, 10–12 mm. long and 11–13 mm. long, respectively; keel 32–34 mm. long, staminal tube 25–27 mm. long; Guerrero. . . . . 41. *T. Abbottiae*

a. Leaflets of the principal leaves 11–31. . . . *c.*

c. Upper lobes of calyx almost completely fused, nearly obsolete or rounded, blunt, 0.5–1 mm. long, the lateral lobes rounded-ovate to oblong; introduced species. . . . *d.*

d. Primary bracts oval, acuminate, deciduous; legume 10–12 cm. long, 13 mm. wide. . . . . 48. *T. Vogelii*

d. Primary bracts subulate, deciduous; legume 6–9 cm. long, 7–9 mm. wide. . . . . 47. *T. candida*

c. Upper lobes of calyx triangular or acuminate, 1.5–2.5 mm. long, the lateral lobes lanceolate-acuminate to lanceolate-subulate or ovate, short-acuminate; indigenous species. . . . *e.*

e. Leaflets 13–31, thin, dull; buds 3–5 at a node; pedicels 8–11 mm. long, slender; claw of keel 5.5–6 mm. long; pods scimitar-shaped, drooping, 5–6.5 cm. long, 4.5 mm. wide, hirtellous. . . . . 3. *T. macrantha*

e. Leaflets 11–17, somewhat coriaceous, shining; buds 5–8 at a node; pedicels 5–8 mm. long; claw of the keel 4 mm. long; legumes 7–10 cm. long, 5–7 mm. wide, hirsutulous. ....28. *T. submontana*

Key 4

Undersurfaces of the leaflets densely tomentose; leaflets large and coriaceous, usually blunt, 1–11; racemes terminal and axillary; Sierra Madre of Mexico from Sinaloa to Guerrero.

a. Calyx 5–7 mm. long; primary bracts narrowly deltoid to linear-lanceolate, 1–2 mm. broad....*b.*

b. Leaflets 3–5; lateral calyx-lobes deltoid to deltoid-lanceolate, acuminate, 2.5–4 mm. long; legume 4–4.5 mm. long, densely hirsutulous with nearly straight, crowded, erect, lustrous hairs................................43. *T. major*

b. Leaflets 7–11; lateral calyx-lobes ovate to ovate-lanceolate, 4–5 mm. long; legume 4–6.5 cm. long, densely tomentose with tortuous and intertwined hairs...............42. *T. pachypoda*

a. Calyx 10–17 mm. long; primary bracts ovate or oval to orbicular, 4–8 mm. broad....*c.*

c. Leaflets 1–3; calyx without bracteoles; bracts deciduous; claw of the keel-petals 4.5 mm. long..............45. *T. platyphylla*

c. Leaflets 1–5; calyx with 2 conspicuous oval inflated deciduous bracteoles; claw of the keel-petals 7 mm. long. ....44. *T. diversifolia*

Key 5

Undersurfaces of the leaflets variously hairy, but not densely tomentose with tortuous, tangled hairs; leaflets 1–41.

a. Flower-buds 2 (or rarely 3) at a node, usually only 2 flowering; inflorescences more or less compact, anthesis proceeding centrifugally, both flowers of a pair in anthesis together; bracts deciduous; stems usually erect; leaflets thin, stomatiferous on both surfaces....*b.*

b. Primary bracts lanceolate, 2–3 mm. broad, acuminate, the base acute; pubescence of stems upwardly directed; pubescence of legume rusty or tawny, at least along the margins; Chihuahua to Guanajuato and Querétaro....8. *T. leucantha*

b. Primary bracts linear to linear-lanceolate, acuminate, rarely more than 1.2 mm. wide....*c.*

c. Stems and axis of inflorescence doubly pubescent, both hirtellous with fine, strongly retrorse hairs and hirsutulous with downward- and outward-curving hairs; corolla white, becoming purplish; pubescence of legume rusty; Arizona, Sonora and Chihuahua............9. *T. Thurberi*

c. Stems and axis of inflorescence with antrorse or spreading hairs; corolla usually bicolored, the banner yellow, the wings and keel rose (rarely white); pubescence of legume white or cinereous; central United States, eastward....................................10. *T. virginiana*

a. Flower-buds 3–5 or more at a node, 3 or more flowering; anthesis usually irregular; racemes more or less elongate (except in *T. vernicosa*)....*d.*

d. Leaflets principally 2–6 mm. wide (rarely 8 mm.); low, decumbent or erect plants with 9–25 leaflets, strigillose to densely strigose or hirsutulous beneath....*e.*

e. Inflorescences terminal or axillary, the latter not emerging obliquely from the axils....*f.*

f. Calyx 4–5.5 mm. long, strigillose; calyx-lobes deltoid

to deltoid-ovate, rather abruptly acuminate, the lateral lobes 2.5–3 mm. long . . . . 24. *T. saxicola*

f. Calyx 6–10 mm. long; lateral and lowermost calyx-lobes narrowly triangular-subulate to lanceolate, long-acuminate, 4–7 mm. long; leaflets densely strigose to hirsutulous beneath. . . . *g.*

g. Parallel lateral veins of leaflets prominent, the veinlets forming elongate areoles between them; upper epidermis of leaflets with stomata; Oaxaca. . . . 26. *T. Pringlei*

g. Parallel lateral veins of leaflets obscure, the veinlets between them forming nearly isodiametric areoles; upper epidermis lacking stomata; Sinaloa and Nayarit. . . . . 25. *T. Seemannii*

e. Inflorescences primarily axillary or some terminal, the axillary inflorescences emerging singly and obliquely from the axils of leaves. . . . *h.*

h. Leaflets linear, 2–6 cm. long, 2–4 mm. wide; calyx 2 mm. long; introduced species, Hispaniola. . . . . . 49. *T. bracteolata*

h. Leaflets narrowly elliptic to linear-oblong or elliptic, 1–3.2 cm. long, (3–)4–10 mm. wide; calyx 3.5–6 mm. long; Sinaloa to Guatemala. . . . . 12. *T. rhodantha*

d. All or most of the principal leaflets 8 mm. or more wide (rarely 6 mm. wide). . . . *i.*

i. Inflorescences axillary only or, if both terminal and axillary, the latter first and best developed, terminating leafy or naked branches. . . . *j.*

j. Leaflets 5–9, large, coriaceous, the areoles between the principal lateral veins isodiametric or nearly so, the upper epidermis estomatiferous. . . . *k.*

k. Inflorescences lax, often spreading and somewhat recurved, calyx 4–5 mm. long, hirtellous or strigillose, the lobes deltoid, abruptly subulate, the lateral lobes 1.5–3 mm. long; Sinaloa to Guerrero. . . . . 39. *T. crassifolia*

k. Inflorescences crowded, ascending; calyx 6–9 mm. long, densely hirsutulous, the lateral lobes lance-subulate, attenuate, 4.5–6 mm. long; Veracruz to Guatemala. . . . . 40. *T. lanata*

j. Leaflets 11–37, membranous, the areoles between the principal lateral veins usually distinctly elongate, the upper epidermis stomatiferous. . . . *l.*

l. Leaflets 11–21; ovules ca. 15; seeds 12–15; legume usually hirtellous. . . . . 12. *T. rhodantha*

l. Leaflets 15–37, predominantly 21–35; ovules and seeds 8–10; legume usually hirsutulous. . . . . 1. *T. multifolia*

i. Inflorescences terminal, both terminal and axillary or apparently opposite the leaves, not exclusively axillary or singly and obliquely inserted in the axils. . . . *m.*

m. Principal leaflets obovate to broadly obovate-cuneate or orbicular, occasionally elliptic; decumbent herbs, branching sympodially; legume 4–5 cm. long, 7–8.5 mm. wide; ovules 4–8; seeds 4–8, tan or stramineous, unmarked. . . . *n.*

n. Leaflets 5–19, primarily 9–11, densely hirsutulous to nearly glabrous above, but with at least a few appressed hairs near the margins, the margins conspicuously bordered with white hairs; calyx and back of banner with whitish hairs; ovules and seeds 5–6. . . . . 22. *T. Lindheimeri*

n. Leaflets 3–9, primarily 5–7, completely glabrous above, the margins not conspicuously bordered; indument of calyx and banner golden; ovules and seeds 4–8 .... 23. *T. potosina*

m. Leaflets not as above; branching monopodial or sympodial; legume (where known) 3.5–6.5 mm. wide (or –7 mm. in *T. Langlassei*) .... *o.*

o. Leaflets 15–41 (except *T. belizensis* 5–19, *T. onobrychoides* 13–29 and *T. nicaraguensis* 9–21); upper lobes of calyx 1–3.5 mm. long, the lateral 1.5–4 mm. long .... *p.*

p. Calyx 5.5–8.5 mm. long, the lateral lobes oblong to obovate, abruptly and usually obliquely short-acuminate, 2.5–4 mm. long, the lowermost lobes lanceolate-ovate to ovate or obovate, 3.5–5 mm. long, 2–4 mm. broad; leaflets 17–41; ovules 10–13; Mexico to Brazil, Bolivia and Peru .... 4. *T. Sinapou*

p. Calyx 3.5–7 mm. long, the lateral and lowermost lobes deltoid, lanceolate, or linear-lanceolate, acuminate or subulate, not obliquely so .... *q.*

q. Upper leaflets of a leaf lanceolate or ovate-lanceolate, 2–7.5 cm. long, glabrous and lacking stomata above, moderately to densely strigillose or short-strigose and silky beneath; Veracruz, Oaxaca, Chiapas, Br. Honduras .... 33. *T. belizensis*

q. Upper leaflets of a leaf linear-oblong, oblong-lanceolate, oblong, elliptic or linear-oblanceolate, obtuse, rounded or cuneate at the base; upper epidermis with stomata (except *T. nicaraguensis*) .... *r.*

r. Ovary and legume strigillose or hirtellous .... *s.*

s. Slender monopodial shrub 2 m. high; leaflets 15–31, oblong to linear-oblong, the base obtuse or somewhat cuneate; vexillary stamen with a 2-lobed callosity on the upper surface near the base; legume curved upward near the distal end; calyx strigillose with cinereous hairs; Sinaloa and Durango .... 2. *T. foliolosa*

s. Erect or decumbent herb, monopodial or sympodial, to 1 m. high; leaflets principally 13–25(–29), linear-oblanceolate or narrowly elliptic to oblong-elliptic or elliptic-cuneate; vexillary stamen flat on the upper surface; legume straight or curved downward distally; calyx doubly pubescent, both hirtellous and hirsutulous or hirsute; south-central United States .... 11. *T. onobrychoides*

r. Ovary and legume hirsutulous; calyx doubly pubescent .... *t.*

t. Leaflets 9–21, narrowly oblong to oblong to elliptic, the base obtuse or rounded, the areoles between the principal lateral veins nearly isodiametric; legumes spreading, straight or curved downward; ovules and seeds 4–8; erect monopodial herb or sub-

shrub 2–5 dm. high; Chihuahua to Nicaragua........................27. *T. nicaraguensis*

t. Leaflets 15–37, linear-oblong, oblanceolate or occasionally elliptic, the base obtuse to rounded; legumes usually drooping, the distal half somewhat curved upward; ovules and seeds 8–10; erect, monopodial herb or shrub 1–2 m. high; Chihuahua to Panama...........................1. *T. multifolia*

o. Leaflets 1–13 (except *T. belizensis* 5–19, *T. onobrychoides* 13–29 and *T. nicaraguensis* 9–21)....*u.*

u. Leaves unifoliolate (or on large plants 1–7 foliolate); ovules 6–7....*v.*

v. Leaflets densely hairy beneath, silvery or silky; calyx 6.5–9.5 mm. long, the lateral lobes 4–7 mm. long; leaflets 1–7................38. *T. Watsoniana*

v. Leaflets sparsely strigillose beneath; calyx 3.5–5 mm. long, the lateral lobes 1.5–3 mm. long; leaves unifoliolate....................21. *T. madrensis*

u. Leaves 5–13-foliolate (except as noted in (*o.*) above)....*w.*

w. Calyx 4–7 mm. long, strigillose or hirtellous to short-strigose or hirsutulous, the upper lobes 1–4 mm. long....*x.*

x. Ovules 4–8; bracts 5–8 mm. long (or –14 mm. in *T. nicaraguensis*); apex of leaflets acute, obtuse or rounded; leaflets hairy above; legumes hirsutulous to hirsute....*y.*

y. Leaflets 9–21; primary bracts persistent. ....27. *T. nicaraguensis*

y. Leaflets 5–13; primary bracts usually deciduous....*z.*

z. Leaflets 7–13, membranous, silky-strigillose beneath; pedicels 5–7 mm. long; upper calyx-lobes 1–2 mm. long....34. *T. mexicana*

z. Leaflets 5–11, thin but rigid, somewhat coriaceous, hirsutulous and pilose beneath; pedicels 7–14 mm. long; upper calyx-lobes 3–4 mm. long..........36. *T. simulans*

x. Ovules 9–11; bracts persistent or deciduous; legumes hirtellous (or in *T. belizensis* sometimes hirsutulous)....*aa.*

aa. Calyx-lobes linear-lanceolate to lanceolate; leaflets 5–19, the upper pairs lanceolate or ovate-lanceolate, glabrous and estomatiferous above, strigillose or short-strigose and silky below; bracts deciduous......................33. *T. belizensis*

aa. Calyx-lobes deltoid or deltoid-ovate ....*bb.*

bb. Leaflets (11–)13–25(–29); axis of inflorescence not flattened; bracts often deciduous, 5–12 mm. long; staminal tube 14–15 mm. long; legume 4.5–5 mm. wide.................11. *T. onobrychoides*

bb. Leaflets 5–11; axis of inflorescence usually flattened, 2-edged; primary bracts 3–9 mm. long, persistent; stam-

inal tube 9–10 mm. long; legume 6 mm. wide .... 20. *T. tepicana*

w. Calyx 8–12 mm. long, the upper lobes 4.5–7 mm. long....*cc.*

cc. Primary bracts persistent, 7–18 mm. long; leaflets lanceolate to ovate-lanceolate, elliptic-lanceolate or oblong-lanceolate, the apex acuminate or occasionally acute; calyx hirtellous and hirsute or villous with golden or rusty hairs; ovules 6–7; legume 6–7 mm. broad, hirsutulous to hirsute. .... 35. *T. Langlassei*

cc. Primary bracts deciduous, 6–11 mm. long....*dd.*

dd. Calyx or pedicels with 1–2 narrow bracteoles; leaflets evenly hirtellous or hirsutulous above, hirsutulous below with cinereous hairs .... 32. *T. pogonocalyx*

dd. Calyx and pedicels without bracteoles; leaflets shining, glabrous or strigillose along the midrib above, strigillose to short-strigose below....*ee.*

ee. Leaflets 5–9, narrowly lanceolate, tapering to both ends, or oblanceolate; inflorescences 2–3 cm. long, compact, subcapitate, the nodes crowded; ovules 6–7 .... 31. *T. vernicosa*

ee. Leaflets (5–)7–13, oblong, oblong-oblanceolate or linear-oblong; inflorescences 6–27 cm. long, slender; ovules 9–10 .... 37. *T. quercetorum*

1. **Tephrosia multifolia** Rose

Tephrosia multifolia Rose, Contr. U. S. Nat. Herb. **1:** 320. 1895. "Creek bottom, Manzanillo," Colima, Mexico, *E. Palmer 1364*, 2–18 Mar. 1891 (US 208929-Type; GH, NY, UC, US).

Cracca multifolia Rose, Contr. U. S. Nat. Herb. **12:** 270. 1909.

Cracca arcuata Rydb. N. Amer. Fl. **24:** 166. 1923. Maria Madre Island, Tres Marias Islands, Nayarit, Mexico, *E. W. Nelson 4193*, 3–25 May 1897 (US 345936-Type; GH).

Tephrosia arcuata (Rydb.) Standl. Field Mus. Publ. Bot. **4:** 213. 1929.

Cracca Heydeana Rydb. N. Amer. Fl. **24:** 166. 1923. Cerro Redondo, Dept. Santa Rosa, Guatemala, *Heyde & Lux*, Oct. 1893 (J. D. Smith Distrib. No. 6111) (NY-Type; GH, US).

Tephrosia Heydeana (Rydb.) Standl. Jour. Wash. Acad. Sci. **17:** 167. 1927.

Erect, much-branched perennial herb or shrub, 1–2 m. high, from heavy woody roots. Stems petioles, rachises and axes of inflorescences hirsutulous, often densely so, with upwardly directed to recurved, rusty to cinereous hairs, velvety. Leaves spreading, 9–34 cm. long, the petioles (6–)10–28 mm. long, shorter than the lowermost leaflets, the rachis (5–) 8.5–27 cm. long; stipules linear, acuminate, 8–18 mm. long, about 1 mm. wide, usually deciduous; leaflets of the principal leaves 15–37, predominantly 21–35, linear-oblong, oblong, oblong-lanceolate or occasionally

elliptic, the base obtuse to rounded, the apex obtuse, rounded or retuse, mucronate, (14–)20–65 mm. long, (4–)6–14 mm. wide, 3–6 times as long as broad, those near the middle of the leaf usually longest, the terminal leaflet often somewhat shorter than the others; leaflets thin, pale below, pubescent on both surfaces, sparsely to densely velvety-hirsutulous above with soft, fine cinereous hairs, moderately hirsutulous to hirsute or strigose below with cinereous or, along the midrib, rusty hairs; petiolules 1.5–2.5 mm. long, densely hirsutulous. Inflorescences terminal and axillary, the latter usually first and best developed, (3–)4–29 cm. long, leafless or very rarely with a single leaf, the peduncle (1.5–)2–9(–12) cm. long; flowering nodes (5–)10–ca. 50; buds 5–7 at a node, ca. 5 flowering, 2 or 3 fruiting. Primary bracts linear, acute or acuminate, 7–10 mm. long, 1 mm. or less wide, 3-veined, usually persistent, although often broken in herbarium-specimens; secondary bracts linear-filiform, ca. 4 mm. long, deciduous. Pedicels slender, 5–8(–9) mm. long, bending somewhat in fruit. Dried flowers (12–)14–17 mm. long. Pedicels and calyces doubly pubescent, hirtellous and sparsely to densely hirsutulous with ascending or spreading rusty hairs. Calyx 3.5–6(–7) mm. long, the upper lobes acuminate, 1–2 mm. long, the lateral and lowermost lance-subulate to narrowly triangular, acuminate, 1.5–4 mm. long and (2–)3–4.5 mm. long, respectively. Corolla apparently white, becoming yellowish or purplish with age and yellow to purple or brown when dry; blade of the banner obovate, oval or suborbicular, 13–15 mm. high, 9.5–13 mm. broad, densely covered with fine silky, pale to rusty hairs on the back, the claw 2–3.5 mm. long; wings 13–17 mm. long, 3–4.5 mm. wide, with a claw 2–3 mm. long; keel 13–17.5 mm. long, shallow, exauriculate, the claw 3–3.5 mm. long. Staminal tube 9–14 mm. long, the vexillary stamen coherent with the tube, free at the base, either flat or with an angular thickening on the upper side near the base. Ovary silky, densely appressed-hirsutulous, 8–10-ovulate. Legume generally with the distal half somewhat upcurved, 4.5–6 cm. long, 4–5 mm. wide, usually drooping, velvety, densely hirsutulous with fine erect or ascending cinereous to tawny hairs; seeds 8–10, brown to gray, variegated with black, (3.2–)3.8–4.8 mm. long, 2–2.6 mm. wide. Somatic chromosomes 22.

Distribution. Primarily at low altitudes (0–1400 m.) from Chihuahua (?) and Sinaloa to Oaxaca and Veracruz to Chiapas, in Mexico, and southward to Panama. Map 1.

Specimens examined. MEXICO. Without locality, *Sessé, Mociño, Castillo & Maldonado 3730* (part), 1787–1795–1804 (F). Chihuahua: Rocky oak slope, Guasaremos, Río Mayo, *Gentry 2463* (A, F, MEXU, MO, UC, US). Sinaloa: Without locality, *Ortega 4859* (US), *Ortega 7170* (CAS, F); steep, moist canyon slope with mixed dominants, pine forest area, 6–7000 ft., Ocurahui, Sierra Surotato, *Gentry 6319* (GH, PH) (for map, see Gentry 1946); Escuinapa, *Ortega 5172* (US); Estero de Escuinapa, *Ortega 6135* (CAS, US); El Habal, Cacalotan, Rosario, *Ortega 1036* (MEXU). Nayarit: Maria Madre, Tres Marias Ids., *Nelson 4193* (GH, PH, US), *Maltby 113* (US), *Solis 28* (MEXU); Arroyo

Honda, Maria Madre, *Mason 1761* (CAS, US); vicinity of Acaponeta, *Rose, Standley & Russell 14227* (GH, NY, US); Acaponeta, *Lamb 521* (GH, MO, NY, DS, US), *M. E. Jones 23021* (F, NY, UC); San Blas and vicinity, *W. G. Wright 1337* (DS, F, GH, MO, UC); Mexcaltitán, Municipalidad Santiago Ixcuintla, *Ortega 6135* (DS, GH, PH, UC). Jalisco: Roadside between Las Palmas and Ixtapa, 100–400 ft., *Nelson 4137* (GH, US); open spaces in woods on steep hill, south of Puerto Vallarta, 50 m., *Mexia 1113* (A, CAS, GH, UC, US). Colima: Manzanillo, *Palmer 1364*, 1891 (GH, NY, UC, US). Michoacán: Woods, Ostula, Dist. Coalcomán, *Hinton 16180* (US). Oaxaca: Jamiltepec, *Conzatti 4400* (NY, US). Veracruz: Low bush in the bed of the Caloboyo near Wartenberg (near Tantoyuca), Huasteca, *Ervendberg 307*, 1858 (GH, K, PH). Chiapas: Escuintla, *Matuda 17* (A, MO, NY, US); Tres Hermanos, *Juzepozuk 1385* (F); outskirts of Mapastepec, *Hernandez X. & Sharp X-175* (GH).

BRITISH HONDURAS. Secondary forest, Temash River, 100 ft., *Schipp 1340* (A, F, GH, MO, NY); Columbia Forest Camp, *Oliphant*, 1929 (F, K, NY).

GUATEMALA. Without locality, *Owen 13* (US). Izabal: Cultivated as fish poison, Jocoló, *Johnson 1187* (US). Jutiapa: Wet thicket near El Molino (Dept. Santa Rosa), 600 m., *Standley 77561* (F); grassy slope between Jutiapa and La Calera, s.e. of Jutiapa, 850 m., *Standley 76062* (F); Jutiapa, *J. R. Johnston 1481*, 1938 (F). Santa Rosa: Cerro Redondo, 4500 ft., *Heyde & Lux*, 1893 (GH, NY, US); Cuajiniquilapa, 2500 ft., *Heyde & Lux*, 1893 (GH, MO, NY, US); Teocinte, 2500 ft., *Heyde & Lux*, 1892 (GH, US); near Los Verdes, *Standley 60403* (F); along road s.e. of Barberena, 1100–1180 m., *Standley 77733* (F); wet thicket, La Joya de Limón, east of Culiapa, 900 m., *Standley 77945* (F); Oratorio, 1200 m., *Standley 60674* (F).

HONDURAS. Pine and oak region, Mont. de la Flor, Tegucigalpa, *C. & W. von Hagen 1236* (NY).

NICARAGUA. Masaya, *C. Baker 196* (CAS, DS, GH, NY, UC), *793* (US), *23* (GH, NY), 692 (US).

EL SALVADOR. Without locality, *Renson 41* (NY, US), *91* (NY, US). Ahuachapán: *Padilla 279* (NY, US). Santa Ana: Dry open hillside, Santa Ana, 655–900 m., *Standley 20432* (US). San Salvador: San Salvador, *Calderón 134* (F); cultivated from seeds from Oriente, Dept. Usulután, *Calderón 8* (F); San Salvador, *Calderón 133* (GH, US), *Velasco*, 1906 (F, US); roadside, San Salvador, 650–850 m., *Standley 19113* (GH, NY, US), *Standley 19646* (GH, US); bank of quebrada, San Salvador, *Standley 20463* (GH, US); brushy slope, San Salvador, *Standley 23148* (US); road from San Martín to Laguna de Ilopango, *Standley 22555* (GH, NY, US). San Vicente: Brushy slope, vicinity of San Vicente, 350–500 m., *Standley 21626* (GH, US).

COSTA RICA. Río Jesus de San Ramón, Alajuela, *Brenes*, 1932 (F); Río Jesús & Picacho del Mondongo de San Ramón, *Brenes*, 1937 (F); "Alto de la Calera," San Ramón, *Brenes 5872*, 1927 (A, F), Jan. 1936 (F),

Jan. 1934 (F); El Paraiso, *Archer 3746* (US); vicinity of Buenos Aires, Puntarenas, *Pittier 3821* (US), *Tonduz 4986* (US); thickets of the Río Ceibo, Buenos Aires, *Conduz 4985* (US); Ujarras de Buenos Aires, *Pittier 10634* (US); Buenos Aires-Osa, *Valerio 919* (F); thickets at Nicoya, *Tonduz 13557* (GH, US); Surubus, *Biolley 7032* (US); Río Nandayuri-Colonia Carmona (Guauac), 100 m., *Jiminez*, 1912 (US).

PANAMA. Chiriquí: Boqueli, Boqueli Dist., *Davidson 591* (A, F, US); between Hato del Jobo and Cerro Vaca, 700–1000 m., *Pittier 5419* (GH, NY, US). Canal Zone: Chiva-Chiva Trail, Red Tank to Pueblo Nuevo, *Piper 5125* (US).

The not inconsiderable number of specimens of this species now available for study fails to show any constant characters for the separation of the three species maintained by Rydberg (1923). All of these plants seem instead to belong to a single, somewhat variable species distributed primarily at low altitudes from Sinaloa and perhaps southwestern Chihuahua, in the west, and Veracruz, in the east of Mexico, southward to Panama. The shrubby habit, numerous thin leaflets, predominantly axillary inflorescences, medium-sized flowers, lance-subulate to narrowly triangular, acuminate calyx-lobes with a double indument, and 8–10-seeded, usually drooping pods are characteristic. The variations in flower-size, leaflet-number, etc. cited by Rydberg do not stand up under examination as either specific or varietal characters. In this connection it should be noted that flower- and calyx-size are often variable in this species, the first flowers at a node being somewhat larger than the last. On a single specimen the length of the calyx may vary from 4–5.5 mm. and that of each of the lobes by a full millimeter.

Several more or less peculiar collections indicate the need for more and better specimens and particularly for observations on such items as habit and position of the inflorescences. The Gentry collections from Chihuahua and Sinaloa are aberrant in appearance with a tendency for "paniculate" inflorescences in which a terminal inflorescence bears lateral branches from the axils of bracts. The altitude is also a very suspicious matter at this latitude, since this species occurs primarily at low levels. The racemes and pods of *Palmer 155* (1895) from Acapulco, Guerrero, are unusually long (to 40 cm. and 7 cm., respectively) and the lowermost calyx-lobe tends to be about 1 mm. longer than in most specimens. A similar collection from Acapulco,

Beechey, 1842, is at Kew. The single seed-bearing Panamanian collection, *Piper 5125*, has unusually small seeds, only 3.2 mm. long and 2 mm. wide.

Tephrosia multifolia appears to be widely grown as a fish-poisoning plant in Central America, where it is known as *barbasco*. The plant undoubtedly contains rotenone and related compounds, but confusion has existed between this plant, "*T. toxicaria*" (= *T. Sinapou*) and "*T. Schiedeana*" (= *T. Sinapou*), so that it is impossible to decipher any of the reported analyses or to determine with certainty the identity of the species mentioned in most anthropological works applying to Central America.

2. **Tephrosia foliolosa** (Rydb.) Riley

Cracca foliolosa Rydb. N. Amer. Fl. **24:** 162. 1923. Cerro Colorado, vicinity of Culiacán [east of Culiacán], Sinaloa, Mexico, *T. S. Brandegee*, 3 Nov. 1904 (US 572117-Type; GH, POM, UC).

Tephrosia foliolosa (Rydb.) Riley, Kew Bull. **1923:** 339. 1923.

Slender shrub about 2 m. high, the base and roots unknown, the stems angled. Stems, petioles, rachises, petiolules and axes of the inflorescences strigillose with cinereous hairs. Leaves 7–18 cm. long, ascending or spreading, the petiole 9–22 mm. long, shorter than the lowermost leaflets, the rachis 5–15 cm. long; stipules subulate or linear-setaceous, 8–10 mm. long, about 0.5 mm. wide, apparently deciduous; leaflets of the principal leaves 15–31, oblong to linear-oblong, the base obtuse or somewhat cuneate, the apex obtuse, rounded or emarginate, mucronate, (15–)20–45 mm. long, (3–)5–11 mm. wide, 3.5–6 times as long as broad, thin, pale beneath, thinly but evenly strigillose above, strigillose below with cinereous hairs, the veins conspicuous. Inflorescences terminal and axillary (sometimes 2 from 1 axil), leafless, ascending, 5–20 cm. long, the peduncle 0.5–4.5 cm. long, the flowering nodes 5–20, buttressed below; buds 5–7 at a node, ca. 5 of these flowering, 1–3 fruiting. Primary bracts subulate or subulate-setaceous, 4–8 mm. long, very narrow, deciduous at anthesis; secondary bracts setaceous, 1–2 mm. long, deciduous. Pedicels very slender, 5–7 mm. long, ascending-hirtellous with cinereous hairs. Dried flowers 16–18 mm. long. Calyx about 4.5 mm. long, strigillose with cinereous hairs, the upper lobes subulate, 1.5–2 mm. long, the lateral deltoid at the base, contracted into a subulate tip, 2.5–3 mm. long, the lowermost subulate, 2.5–3 mm. long. Corolla "white tinged with purple" (Brandegee), the banner with a green spot at the base and yellowish to brownish when dry; blade of the banner oval, ca. 15 mm. high, 11–12 mm. broad, silky with fine hairs on the back, the claw 2–2.5 mm. long; wings 15–17 mm. long, 3.5–4.5 mm. wide, auricled at the base on the upper side, the claw ca. 2.5 mm. long; keel shallow, 18–20 mm. long, scarcely or not at all auricled, the claw ca. 3 mm. long. Staminal tube 12–14 mm. long, the vexillary stamen adnate to the sheath, free at the base, with a conspicuous 2-lobed callosity

on the upper side near the base. Ovary strigillose, 8–11-ovulate. Legume slightly sinuate, curved upward near the end, 4.5–6 cm. long, 4–4.5 mm. wide, ascending or spreading, brown, densely hirtellous with cinereous hairs 0.2–0.4 mm. long, appearing hoary, velvety; seeds (3–)8–11, oval to oblong in outline, cylindric to compressed, 3–3.8 mm. long, 1.8–2.4 mm. wide, light brown to gray, variegated with black or brown. Somatic chromosomes 22.

Distribution. Central Sinaloa and adjacent Durango, Mexico. Map 1.

Specimens examined. MEXICO. Sinaloa: Bush, 6 ft., Cerro Colorado, vicinity of Culiacán, *Brandegee*, 1904 (GH, POM, UC, US). Durango: Slender shrub 2 m. high, rocky grassy slopes in oak forest, 3000 ft., Sierra Tres Picos, *Gentry 5279*, 19 Dec. 1939 (DS, GH, MEXU, MO, NY, UC).

Although this plant is poorly known, it appears to be a distinct species. It is reminiscent in appearance of both *Tephrosia leiocarpa* and *T. multifolia*, but is easily distinguished from the former by the narrow, hirtellous pods and from the latter by the spreading or ascending pods, the leaflet-shape (which is closer to that of *T. leiocarpa*), the short trichomes of a single length on pedicels, calyx and fruit and the presence of both terminal and axillary inflorescences. Most herbarium-specimens of *T. multifolia* show only axillary inflorescences, and even when both types are present the axillary inflorescences are usually first and best developed.

3. **Tephrosia macrantha** Robinson & Greenman ex Pringle

Tephrosia macrantha Robinson & Greenman ex Pringle, Garden & Forest **7:** 153, 173. fig. 32. May 1894. Tequila, Jalisco, Mexico.

Tephrosia macrantha Robinson & Greenman, Proc. Amer. Acad. **29:** 383. June 1894. "Hills," Tequila, Jalisco, Mexico, *C. G. Pringle 4454*, 5 Oct. 1893 (GH-Type; A, MEXU, MO, PH, UC, US).

Cracca macrantha (Robinson & Greenman) Rose, Bot. Gaz. **40:** 103. 1905.

Erect herbaceous perennial or shrub 1–4 m. high, much branched, the branches monopodial, often sulcate, angled to terete. Branches, axes of the inflorescences, petioles and rachises finely hirtellous with recurved or ascending hairs and hirsutulous with ascending to downwardly and outwardly spreading hairs or strigillose and short-strigose with antrorsely directed hairs. Leaves spreading or ascending, the principal leaves 6.5–22 cm. long, the petioles (7–)11–30 mm. long, shorter or longer than the lowermost leaflets, the rachis (4–)5–16 cm. long; stipules linear-acuminate, 10–15 mm. long, 1 mm. or less wide, deciduous or often detached; leaflets of the principal leaves 13–31, linear-elliptic to elliptic or linear-oblong to

oblong-lanceolate, the base obtuse or somewhat cuneate, the apex acute, obtuse, rounded or retuse, short-mucronate; leaflets 15–55 mm. long, 4–12(–14) mm. wide, 2.5–4.5 times as long as broad, the terminal leaflet often somewhat smaller than the lateral; leaflets thin, pale beneath, the veins often conspicuous, thinly to densely strigillose, hirtellous or hirsutulous beneath with cinereous hairs, appearing somewhat canescent, or often rusty along the midrib. Inflorescences terminal and axillary (occasionally 2 from 1 axil), 5–25 cm. long, the peduncles 1.5–4.5 cm. long, the flowering nodes 6–ca. 35, somewhat buttressed below; buds 3–5 at a node, apparently 2 or 3 flowering, 1 or 2 fruiting. Primary bracts linear, gradually acuminate, 6–12 mm. long, 1 mm. or less wide, deciduous at anthesis; secondary bracts linear-setaceous, 3–6 mm. long, deciduous. Pedicels 8–11 mm. long, very slender, ascending in flower. Dried flowers (18–)20–26 mm. long. Calyx campanulate, 6–6.5 mm. long, hirtellous or both strigillose and short-strigose or hirtellous and hirsutulous, the upper lobes acuminate, 1.5–2.5 mm. long, the lateral and lowermost lanceolate, acuminate, to lance-subulate, 4–5 mm. long and 4.5–5.5 mm. long, respectively. Corolla showy, apparently white, becoming lavender, and brown or lavender in dried specimens; banner strongly recurved in flower, finely silky-hirsutulous on the back, the blade oval to suborbicular, with a conspicuous green spot at the base, 20–22 mm. high, 17–19 mm. broad, the slender claw 4–4.5 mm. long; wings oblong, obscurely auricled at the base, 23–27 mm. long, 4–5 mm. wide, the claw 4.5–5 mm. long; keel shallow, exauriculate, 21–26 mm. long, the slender claw 5.5–6 mm. long. Staminal tube 18–22 mm. long, the vexillary stamen with a prominent angular or collar-like callosity near the base, coherent, except at the base, with the tube which bears a prominent knob on the free edge at either side near the base. Ovary densely silky-strigillose with fine rusty or tawny hairs. Mature fruit unknown, the half-ripe legume scimitar-shaped, the proximal portion straight, the distal portion curved upward, 5–6.5 cm. long, 4.5 mm. wide, densely hirtellous with tawny hairs, drooping; seeds 8–10, the mature seeds unknown. Flowering collections from September through November.

Distribution. At altitudes of 400–1400 m. in Jalisco, México, Colima and Guerrero, Mexico. Map 2.

Specimens examined. MEXICO. Jalisco: Hills, Tequila, *Pringle 4554* (A, GH, MO, MEXU, PH, UC, US); barranca of Guadalajara, 4000 ft., *Pringle 11435* (GH, US), *M. E. Jones 27206*, 1930 (NY, UC, US); near Guadalajara, *Rose & Painter 7352* (GH, NY, US); Etzatlán, *Holway 5100* (US), *Rose & Painter 7526* (GH, US). Colima: Tuxpan Canyon, *Orcutt 5316*, 1910 (US). Guerrero: Sierra Madre, 1300 m., *Langlassé 596* (GH, US) (See discussion, *T. major*); oak forest, Sierrita-Palo Solo, Dist. Galeana, 600 m., *Hinton 14999* (GH); trail west of Suriana, Achotla, Sierra Madre del Sur north of Río Balsas, Dist. Aldama, *Mexia 8806* (GH, MO, NY, UC, US); Temixco, 400 m., *Reko 5013* (US); oak forest, San Antonio, Dist. Montes de Oca, *Hinton 11558* (GH). México: Llano, Plaza de Gallos, Dist. Temascaltepec, 1200 m., *Hinton 5172* (A, NY, US); hill, Tenayac, Dist. Temascaltepec, 1380 m., *Hinton 5099* (GH).

The handsome large flowers of this plant are its most outstanding feature; even on herbarium-specimens these usually exceed 20 mm. in length. The slender keel, 21–26 mm. long, with a long claw, the long staminal tube with prominent callosities, the shrubby habit and the numerous thin leaflets are particularly characteristic. Most specimens have retrorse pubescence on stems, petioles and rachises, but this is by no means constant.

Pringle inadvertently described this species in Garden & Forest in May, 1894, in advance of the formal description by Robinson and Greenman in June of the same year. Pringle had, however, noted in the April issue of that journal that "*Tephrosia macrantha* Robinson & Greenman" was one of the new species discovered by him on his Mexican collecting trip of 1893 and that it would be figured and described in a subsequent issue. His brief, informal description, accompanied by an excellent drawing of this plant, constitutes publication of the species, so that the proper citation is *Tephrosia macrantha* Robinson & Greenman ex Pringle. In view of the unusual publication of the name, the Type of the species should be the specimen designated by Robinson and Greenman in their much more complete description.

4. **Tephrosia Sinapou** (Buc'hoz) A. Chev.

Galega frutescens, flore purpurea, foliis sericeis Burm. Plum. Ic. 126. pl. 235. 1750.

Cytisus? 2. P. Browne, Civ. & Nat. Hist. Jamaica, ed. 1. 296. 1756.

Galega Sinapou Buc'hoz, Hist. Univ. Reg. Veg. pl. 994. 1775. Without description; figure and name only, but the figure diagnostic.

Tephrosia Sinapou (Buc'hoz) A. Chev. Compt. Rend. Acad. Sci. Paris **180:** 1522. 1925, as *Singapou.*

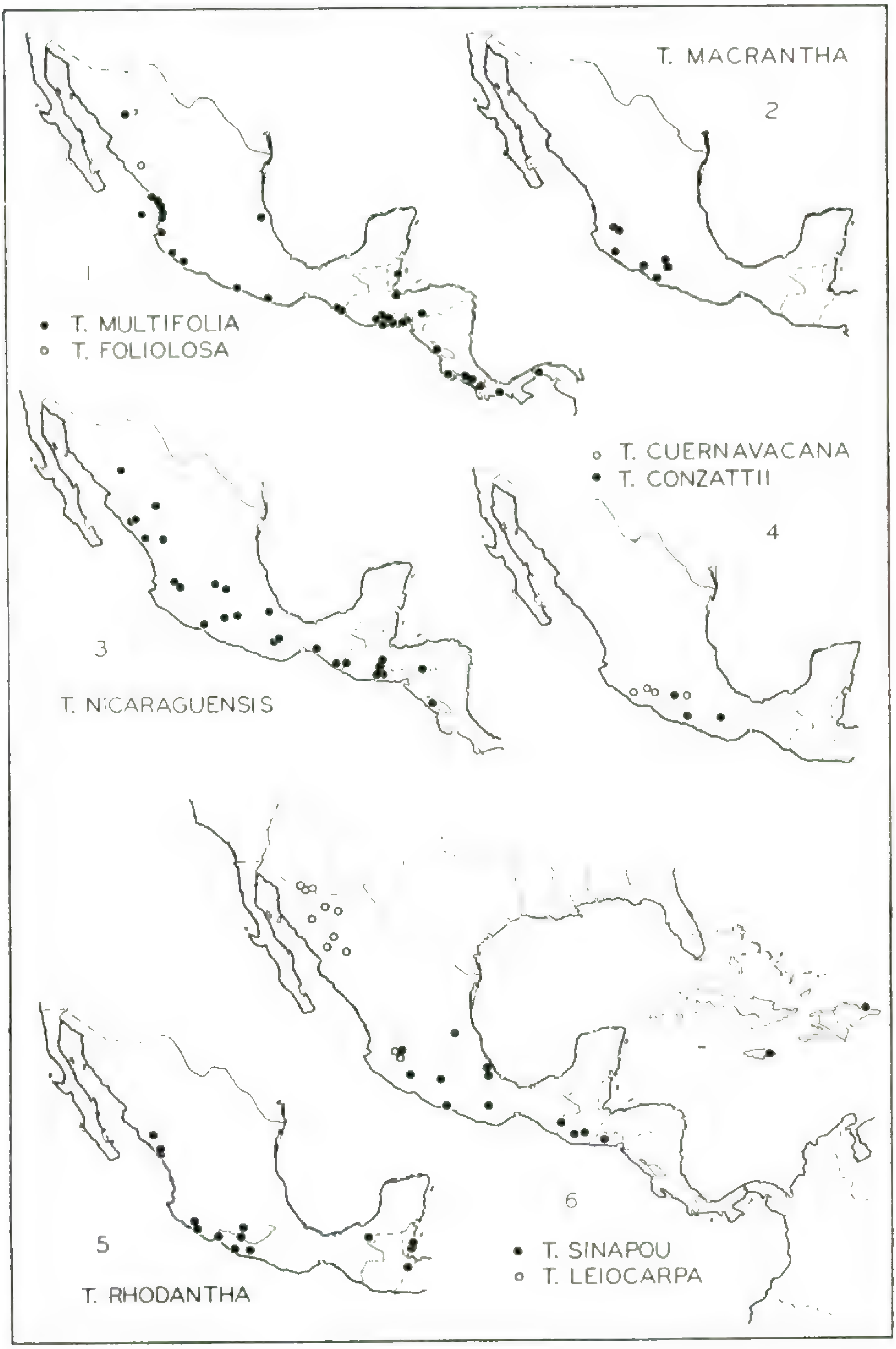
Galega sericea Lam. Encyc. **2:** 596. 1786, not Thunb. 1800, Buch-Ham. 1822, nor *Tephrosia sericea* (Thunb.) Pers. 1807, nor *T. sericea* Baker in Oliver, 1871.

Galega toxicaria Sw. Prod. Veg. Ind. Occ. 108. 1788. Diagnosis inconclusive but based on *Galega frutescens*, etc. Burm. and *Cytisus? 2.* Browne, both of which are undoubtedly this species.

Tephrosia toxicaria (Sw.) Pers. Syn. Pl. **2:** 329. 1807.

Cracca toxicaria (Sw.) Kuntze, Rev. Gen. **1:** 175. 1891.

Tephrosia emarginata HBK. Nov. Gen. et Sp. (folio) **6:** 361. Sept. 1824; Op. cit. (quarto) **6:** 461. Sept. 1824. *"Crescit ad ripam Atabapi, prope La Divina Pastora de San Balthasar, (Missiones del Orinoco)," Humboldt & Bonpland*, May 1800. This locality is apparently on the Río Atabapo near San Fernando de Atabapo, Colombia-Venezuela boundary between


T. MACRANTHA
2
1
T. MULTIFOLIA
T. FOLIOLOSA
T. CUERNAVACANA
T. CONZATTII
4
3
T. NICARAGUENSIS
6
5
T. SINAPOU
T. LEIOCARPA
T. RHODANTHA

Dept. Vaupes, Colombia, and Terr. Amazonas, Venezuela. (See Sandwith, Kew Bull. **1925:** 295–310. 1925.)

Tephrosia Schiedeana Schlecht. Linnea **12:** 299. 1838. Barranca de Tioselo near Hacienda de la Laguna, near Jalapa, Veracruz, Mexico, *Schiede*, 29 Aug. 1829 (GH, NY).

Cracca Schiedeana (Schlecht.) Standl. Contr. U. S. Nat. Herb. **23:** 474. 1922.

Orobus sericeus Sessé & Moc. La Natureleza II. **1:** app. 118. 1889. New Spain (Mexico). Fragments of *Sessé & Mociño 3736* (F), marked "*Orobus sericeus*, N[obis]," are *T. Sinapou* and *T. multifolia* Rose. The description applies to *T. Sinapou*, although the characters given are not diagnostic.

Erect herbaceous or suffrutescent perennial to 1 m. high; stems prominently sulcate and angled, branching monopodially. Stems, petioles, rachises, petiolules, axis of inflorescence and pedicels densely hirtellous to hirsutulous with rusty or cinereous, often recurved or retrorse hairs, appearing velvety. Leaves (11–)16–35 cm. long, ascending or spreading, the petiole (7–)20–50 mm. long, longer or shorter than the lowermost leaflets, the rachis (8–)12–25 cm. long; stipules linear, acuminate, to linear-setaceous, 10–17 mm. long, 1 mm. or less wide, persistent, but often broken in herbarium-specimens; leaflets of the principal leaves 17–41, narrowly elliptic to linear-oblong or oblong-oblanceolate to linear-lanceolate, mucronate, 2–6 cm. long, (4–)7–18.5 mm. wide, 3.5–6 times as broad, thin, dull, pale beneath, moderately hirtellous to hirsutulous with fine cinereous hairs above, densely hirtellous to hirsutulous with ascending or somewhat appressed cinereous hairs beneath, appearing somewhat silky or dull, the midrib and principal lateral veins sometimes outlined with hairs; petiolules 1–2.5 mm. long. Inflorescences terminal and from the upper axils, the terminal often with 1–7 branches from the axils of bracts, leafless or rarely the terminal inflorescence with a leaf at the lowermost node, (2–)4–30 cm. long, longer or shorter than the leaves, ascending, the peduncle 2–8 cm. long, sulcate, angled, the flowering nodes 5–ca. 25; buds about 6 at a node, 5 of these flowering, 1–3 fruiting. Primary bracts linear-lanceolate, acuminate, 6–8 mm. long, 1–1.5 mm. wide, apparently deciduous soon after anthesis; secondary bracts linear-setaceous, 5–6 mm. long, 0.5 mm. wide, deciduous. Pedicels 5–8 mm. long, ascending, becoming stout in age. Dried flowers 16–22 mm. long. Calyx 5.5–8.5 mm. long, densely hirtellous to strigillose with cinereous or rusty hairs, the upper lobes nearly completely fused, the free portion 1–3.5 mm. long, the lateral lobes oblong to obovate, abruptly and usually obliquely short-acuminate, 2.5–4 mm. long, 1.5–3.5 mm. broad, the lowermost lanceolate-ovate to ovate or obovate, 3.5–5.5 mm. long, 2–4 mm. broad. Corolla white, the base of the banner with a green spot, the wings marked with violet on the upper side near the base; corolla apparently becoming pinkish or purplish in age; blade of the banner suborbicular, 13–15 mm. high and broad, densely silky-strigose with fine hairs on the back, the claw 2.5–4 mm. long; wings 13–19 mm. long, 3.5–4.5 mm. broad, auricled on the upper side near the base, the claw 3–4 mm. long; keel 14–19 mm. long, the claw 4–5 mm. long.

Staminal tube 11–14 mm. long, the vexillary stamen coherent with the tube, free at the base, with a prominent 2-lobed callosity on the upper surface. Ovary densely hirsutulous or short-strigose, silky; ovules 10–13. Legume nearly straight or slightly curved downward, ascending or spreading, (3.5–)4.5–5.5 cm. long, 4–6.5 mm. wide, hirtellous and hirsutulous with rusty or cinereous hairs, these sometimes somewhat appressed and appearing silky; seeds 8–13, oval-reniform to subquadrate in outline, 2.6–4 mm. long, 2.2–2.6 mm. broad, brown, variegated with black. Somatic chromosomes 22.

Distribution. San Luis Potosí and Veracruz, in eastern Mexico, and Jalisco, in western Mexico, to Guatemala and El Salvador; Jamaica, Hispaniola; Colombia to Ecuador and Peru and in Venezuela, the Guianas, Brazil and Bolivia, primarily in the Amazon drainage; often cultivated. Map 6 (North American localities).

Specimens examined. MEXICO. Without locality, *Sessé, Mociño, Castillo & Maldonado 3736*, 1787–1795–1804 (F); *Muller 958* (NY). San Luis Potosí: Barranca, Las Canoas [west of Rascón], *Pringle 5049* (GH). Veracruz: Orizaba, *Muller 1318* (NY); Orizaba, *Botteri 370* (GH); Mt. Orizaba, *Seaton 506* (GH); region of Orizaba, Borrego, *Bourgeau 2797* (GH), *2797b* (GH); rocky slope, north side of Borrego, Orizaba, *Clausen & Cervantes G. 6215* (MEXU); barranca of Tioselo near Hacienda de la Laguna (near Jalapa), *Schiede*, 1829 (GH, NY); Fortín, Zacuapán, *Purpus 7479* (UC); oak forest, Zacuapán, *Purpus 16368* (A, F); dry open brush woods, sunny slopes, Barranca de Tenampa, Zacuapán, *Purpus 1889* (GH, MO, NY, UC, US). Jalisco: Río Blanco, *Palmer 220* (part), 1886 (GH, K, PH, US); Guadalajara, *Palmer 322*, 1886 (GH, NY, PH, US); barranca of Río Blanco near Guadalajara, 4500 ft., *Pringle 11436* (GH, MEXU, US). México: Llano, Luvianos, Dist. Temascaltepec, *Hinton 8114* (GH, US); Volcán, Dist. Temascaltepec, *Hinton 4683* (F, GH, NY, US). Michoacán: Open pine forest above Achuato, Apatzingán, 3200 ft., *Leavenworth & Hoogstraal 1624* (F, GH, MO, NY). Oaxaca: Oaxaca, *Nelson*, 1894 (US).

GUATEMALA. Guatemala: Without locality, *Aguilar 110* (F); near Guatemala, *Hayes 25* (GH, US). Huehuetenango: Rocky slopes above La Libertad, on Cerro Pueblo Viejo, 1900 m., *Steyermark 50991* (F); trail between Democracia and Santa Ana Huista, Sierra de los Cuchumatanes, 800–1000 m., *Steyermark 51312* (F). Sololá: Dry slopes above San Pedro village, 1900–2000 m., *Steyermark 47163* (F).

EL SALVADOR. Inzacatal, vicinity of San Salvador, 650–850 m., *Standley 22395* (US).

DOMINICAN REPUBLIC. In clearing, Las Lagunas, Cordillera Central, Prov. de Azua, 750 m., *Ekman H6356* (US); vicinity of Laguna, Samaná Peninsula, chiefly on the Pilón de Azucar, 100–500 m., *Abbott 267* (US).

JAMAICA. Brandon Hill, 330 m., *Fawcett 8045* (F, NY); Castleton, *Harris* (NY).

COLOMBIA. Without data, *Mutis 1199* (US); Municipio Florencia, Hacienda "Morelia", 225 m., *Plata G. 79* (US). Boyacá: Río Meta, Cubarral, 180 m., *Cuatrecasas 3668* (US). Chocó: Lloró, 50 km. s. e. of Quibdó, at junction of Río Atrato and Río Andagueda, *Archer 2116* (US); Río Pató, affluent of Río Quito, *Archer 2113* (US). Cundinamarca: La mesa, between Giradot and Facatativa, *Bro. Ariste-Joseph A390* (US). Huila: Neiva, *Archer 3349* (US). Magdalena: Open pasture, mts. just east of Manaure, 1700 m., *Haught 4107* (US); northern slope of Sierra Nevada de Santa Marta, *Seifriz 604* (PH). Putumayo: Mocoa, Río Mocoa, 570 m., *Cuatrecasas 11356* (US), *Archer 3409* (US). Valle del Cauca: La Paila, *Holton*, 1853 (GH, PH); Almaguer, *Lehmann 6147* (US); Popayán, *Archer 3382* (US); La Capilla, 1760 m., Popayán, *Arbelaez & Cuatrecasas 6028* (US); La Trojita, Río Calima (region del Chocó), 5–50 m., *Cuatrecasas 16500* (US); Río Palo between Tacueyó and El Palo, 1450–1700 m., *Cuatrecasas 19540* (A, US); Río Garrapatas, west of Andes of Roldanilla, *Lehman 8399* (F, GH, US). Vichada: Ruins of burnt finca, Río Vichada at Masaguaro, 100 m., ca. 30 km. n.e. of San José de Ocuné, *Hermann 11017* (US); El Porvenir, Río Meta, 145 m., *Cuatrecasas 4443* (US).

ECUADOR. Carchi: Cultivated, Maldonado, *Steere 8071* (F). Chimborazo: Tixán, *Rose & Rose 22406* (GH, US). Napo-pastaza: Cultivated in open field, trail Puyo to Canelos, "Chacra" of Sebastián, 1100 ft., *Mexia 6836* (UC). Tungurahua: Humid forest, San Francisco, 10 mi. n.e. of Ambato, 8500 ft., *Tate 567* (US).

PERU. *Ruiz & Pavon 21/3*, 1778–1788; Santa Ana, 900 m., *Cook & Gilbert 1436* (US). Ayacucho: Cultivated, Aina, between Huanta and Río Apurimac, 750–1000 m., *Killip & Smith 23189* (US), *22558* (F, US), *22300* (F, US). Cuzco: *Bues*, 1930 (F); Machu Picchu, 2100 m., *Cook & Gilbert 1018*. Huanuco: Pampayacu, *Kanehira* (F, GH); between Huanuco and Pampayacu, *Kanehira* (A). Junín: Colonia Perené, *Rodriguez*, 1930 (US); cultivated, Río Pinedo, north of La Merced, 700–900 m., *Killip & Smith 23645* (US); brushy slope, La Merced, 4000 ft., *Macbride 5661* (F); cultivated, east of Quimirí Bridge, La Merced, 800–1300 m., *Killip & Smith 23880* (US); cultivated, Río Perené, near Hacienda 3, Colonia Perené, 600 m., *Killip & Smith 25134* (F, US); cultivated, Pichis Trail, Yapas, 1350–1600 m., *Killip & Smith 25489* (F, US); cultivated, Pichis Trail, Eneñas, 1600–1900 m., *Killip & Smith 25719* (F, GH, US), *25731* (US); Puerto Bermudez, 375 m., *Killip & Smith 26608* (US). Loreto: Forest, Mishuyacu, near Iquitos, 100 m., *Klug 720* (US), cultivated, *1011* (F, US); Hacienda of C. W. Perry, Puerto Leguia, *Killip & Smith 27503* (F, US); clearing, Balsapuerto, lower Río Huallaga basin, 150–350 m., *Killip & Smith 28459* (F, US); clearing, Santa Rosa, lower Río Huallaga below Yurimaguas, 135 m., *Killip & Smith 28811* (F, US); clearing, Peña Blanca, on Río Itaya, 110 m., *Killip & Smith 29677* (F, US); lower Río Nanay, *L. Williams 441* (F, US); Palta-Cocha on the upper Río Nanay, *L. Williams 1267* (F); Santa Rosa, lower Río Huallaga, 155–210 m., *L. Williams 4959* (F); Yarina Cocha, 155 m., *Tessmann 5407* (US-photo).

BOLIVIA. La Paz: Polo-Polo near Coroico, 1100 m., *Buchtien 3785* (F, GH, US), *662* (F). Locality illegible, *M. Cardenas 2010* (US).

VENEZUELA. Amazonas: Cultivated, San Carlos, Río Negro, 100 m., *L. Williams 14635* (F, US). Anzoátegui: Río Chive, *Pittier 15054* (US). Bolivar: Cultivated, Mata Negra, south of El Tigre, 100 m., *L. Williams 13389* (F, US). Tachira: Cultivated, but seed brought from Mesa Rica Mts. near by, San Cristobal, *Archer 3200* (US).

BRITISH GUIANA. Cultivated, Bootooba, Demerara River, *Persaud 63* (F); upper Mazaruni River, long. ca. 60° 10′ W., *De La Cruz 2074* (F, GH, US); dry sandhills east of Rockstone, *Gleason 822* (GH, US); Indian clearing, Tumatumari, *Gleason 325* (GH, US), 388 (GH, US); cultivated, Bonisika Landing, Arawau River, Northwest Dist., *Archer 2315* (US); Morawhanna, *Archer 2421* (US); cultivated, Mabaruma Compound, Northwest Dist., *Archer 2247* (US); Pirara, etc., *Schomburgk 267* (US); Waramuri Mission, Moruka River, *De La Cruz 2503* (F, GH, PH, US), *2594* (F, GH, PH, US).

SURINAME. Cultivated, Carolina and vicinity, *Archer, 2883* (US); cultivated, 22 km. south of Paramaribo, *Archer 2880* (US); cultivated, Vredenburg Weg, *Archer 2858* (US); Scotelweg, *Archer 2646* (US, UC); Forest of Zandery, *Samuels 517* (F, GH, US); cultivated, Sandrij Id., *Archer 2768* (US); Paramaribo Botanic Garden, *Fairchild*, 1932 (US).

FRENCH GUIANA. Karouany, *P. Sagot 121*, 1858 (GH).

BRAZIL. Voyage de M. le Dr. *Jobert* au nord du Bresil, 1877–78 (F); Río Juanambu ad confluens Río Buesaquito, 1250 m., *André 2893* (F, GH). Amazonas: Cultivated, Río Branco, Boa Vista, *Ducke 1383* (A, US). Maranhaõ: Cultivated, Ubim, Maracassume River Region, *Froes 1729* (A, F, US). Pará: Cultivated, Tapana, near Pará, *Killip & Smith 30233* (US), *30234* (US); vicinity of Santarem, *Spruce*, Aug. 1850 (GH).

Tephrosia Sinapou is an easily recognized species of Mexico and Central and South America where it is still employed as a fish-poison and insecticide. In pre-Columbian times its culture was presumably widespread in the Caribbean area but the plant is now limited in that region to Hispaniola and Jamaica. The species is distributed from Veracruz, on the east, and Jalisco, on the west of Mexico, southward to Guatemala and El Salvador, but there a gap appears in the range, for the plant apparently skips the remainder of Central America to reappear in Colombia, Venezuela, the Guianas, Brazil, Bolivia, Peru and Ecuador, primarily in the Amazon Basin. The two areas so defined seem to have populations which differ somewhat in the shape and width of the calyx-lobes. On specimens from Central America, the lateral calyx-lobes are oblong to obovate and abruptly and obliquely short-acuminate, while the lowermost lobe is ovate or obovate. In many South American collections there seems to be

a strong tendency toward narrower calyx-lobes, particularly in the eastern part of this area, so that the lateral lobes may be oblong and the acumination less oblique; the lowermost lobe may be lance-ovate or ovate. There are many intermediates between the two types and the problem needs to be studied more carefully to determine the amount of variability in populations throughout the range.

It is conceivable that differences between the Central and South American plants may be due at least in part to selection in cultivation. Throughout much of the range in South America the plant seems to be represented primarily in cultivation and it is likely that it would not persist in many areas without continued care. Ducke (1939, p. 112–113), for example, records specimens from Santarem in Pará and Parintins in Amazonas, Brazil, and notes that this species occurs in abandoned places, probably growing subspontaneously in Amazonia. If the plant has been spread primarily by man in these regions in connection with its use as a fish-poison, as seems likely, it is possible that considerable selection may have taken place.

The species is likely to be confused only with *Tephrosia multifolia* Rose which occurs from Mexico southward to Panama; the two may be distinguished immediately by the calyx-lobes and inflorescences. The oblique contraction of the lateral lobes of the calyx of *T. Sinapou* is usually evident and is not found in *T. multifolia* in which the lobes are lance-subulate to narrowly triangular and evenly acuminate. The inflorescences of *T. multifolia* are primarily axillary (at least on herbarium-specimens) while those of *T. Sinapou* are definitely terminal and from the upper axils.

Unfortunately, the well-established name *Tephrosia toxicaria* (Sw.) Pers., by which this plant has long been known, must be discarded in favor of the combination *Tephrosia Sinapou*, based on *Galega Sinapou* Buc'hoz. The basonym rests solely on a single plate, without description, but quite recognizable as this species (the South American and Caribbean form), including crude dissections of the flower which satisfy the requirements of Art. 44, International Rules of Botanical Nomenclature, ed. 3. There seems to be no way of avoiding this change to the earlier name.

Although "*Tephrosia toxicaria*" has been mentioned frequently in ethnological writings and in connection with studies on rotenone, it is impossible to determine whether the plant in question is *T. Sinapou* or *T. multifolia*, which has been confused taxonomically with this species and which was also known for a period as *T. Schiedeana* (= *T. Sinapou*). Although the rejection of so appropriate a name as *T. toxicaria* is to be lamented, the lapse of this name will perhaps contribute to clarity in preventing future confusion as to which species is intended. The documentation of ethnological, chemical, insecticidal and agricultural researches with specimens of the plants involved would prevent the invalidation, which occurs in a case such as this, of much work of this type. One happy circumstance in this particular instance is that, since *T. multifolia* is not known to occur in South America, reports of *T. toxicaria* from that region may be referred to *T. Sinapou* with reasonable certainty, the only other large species with which this can possibly be confused being the introduced *Tephrosia candida* DC., a very different plant.

5. **Tephrosia leiocarpa** A. Gray

Tephrosia leiocarpa A. Gray, Pl. Wright. **2:** 36. 1853. "On the Sonoita, near Deserted Rancho, Sonora" (probably near the middle of the base of the east side of the Huachuca Mountains, southwestern Cochise County, Arizona), *C. Wright 965*, 15–16 Sept. 1851 (GH-Type; NY, PH, US).

Cracca leiocarpa (A. Gray) Kuntze, Rev. Gen. **1:** 175. 1891.

Tephrosia affinis S. Wats. Proc. Amer. Acad. **21:** 424. 1886. Hacienda San José (about 25 miles south of Batopilas on the Río Batopilas), southwestern Chihuahua, Mexico, *E. Palmer 55*, Sept. 1885 (GH-Type; MEXU, NY, PH, US).

Cracca affinis (S. Wats.) Rose, Contr. U. S. Nat. Herb. **12:** 269. 1909.

Tephrosia viridis M. E. Jones, Contr. West. Bot. **12:** 7. 1908. Guayanopa Canyon, Sierra Madre, 3600 ft., Chihuahua, Mexico, *M. E. Jones*, 24 Sept. 1903 (POM-Type; DS, POM, US).

Cracca calva Rydb. N. Amer. Fl. **24:** 161. 1923. Slopes of the barranca of Guadalajara, Jalisco, Mexico, 4500 ft., *Pringle 9773*, 11 June 1902 (NY-Type; GH, MO, US).

Suffrutescent perennial or low shrub, 3.5–ca. 10 dm. high, from a thick woody root; stem much branched, monopodial, terete or obtusely angled, sulcate; bark of woody portions tan to brown, striate. Stems, petioles, rachises, petiolules, axes of inflorescences, pedicels and calyces strigillose with fine cinereous or golden hairs. Leaves principally 6–15 cm. long, the petiole 7–32 mm. long, longer or shorter than the lowermost leaflets, the lower petioles longer than the upper, the rachis 2.3–7.2 cm. long; stipules linear-setaceous, 4–12 mm. long, 0.5 mm. or less wide, persistent,

brown, erect or ascending; leaflets of the principal leaves 9–23(–27), linear-oblong to oblong-oblanceolate or elliptic, 11–43 mm. long, (3–)4–12 mm. wide, 3–6 times as long as broad, the apex obtuse, rounded or retuse (terminal leaflets), mucronate, bluish-green (when fresh), glabrous above, sparsely to moderately strigillose beneath with fine cinereous hairs, the veins prominent, stramineous or brownish; petiolules slender, 1–3 mm. long. Inflorescences terminating the principal stem or axillary branches, often with 1–7 branches from the axils of bracts so as to appear paniculate, usually leafless (occasionally the lowermost flowers in the axil of a leaf), the branches straight, erect or ascending, often exceeding the leaves, 3–27 cm. long, the peduncle 0.2–9 cm. long; flowering nodes 3–25, the buds 3–6 (–7) at a node, 2–4 flowering and 1 or 2 fruiting. Primary bracts linear-setaceous, 4–9 mm. long, 0.5–0.7 mm. wide, becoming brown, usually deciduous at or soon after anthesis; secondary bracts about 3 mm. long, nearly setaceous, deciduous. Pedicels 4–7 mm. long, ascending. Dried flowers 15–19 mm. long. Calyx 4.5–6 mm. long, the upper lobes subulate, 1–2.5 mm. long, the lateral deltoid, short- or long-acuminate, 2–3.5 mm. long, the lowermost lanceolate, acuminate, 3–5 mm. long. Corolla white, becoming pink and then carmine in age, the banner with a pale green spot at the base and the back brownish or rusty; blade of the banner oval, rarely slightly auricled at the base, 12–17 mm. high, 11–15 mm. broad, finely strigillose on the back, the claw 2.5–3.5 mm. long; wings linear-oblong, or obliquely so, auricled, 14–20 mm. long, 3–5.5 mm. wide, the claw 3–4 mm. long; keel 15–18 mm. long, with or without an auricle at the base, the claw 2.5–4 mm. long. Staminal tube 12–15 mm. long, the vexillary stamen with a conspicuous callosity near the base, coherent with the tube for about 1/3 of its length, free at the base. Ovary glabrous or strigillose along the upper suture. Legume nearly straight, spreading or ascending, (3–)5–6.5 cm. long, 5–6.5 mm. wide, glabrous or with a few fine hairs on the upper suture, narrowed at the base; seeds (3–)9–11, oval to oblong-reniform, brown variegated with black, (2.8–)3.4–4.8 mm. long, 2.6–3 mm. wide. Somatic chromosomes 22. Flowering collections from mid-June (Jalisco) to late July and early September.

Distribution. Dry, well-drained slopes in pineland, oak woodland, o open rocky ground, at 1000–1500 m., from southern Arizona to Sonora western Chihuahua and the region of Guadalajara, Jalisco, Mexico Map 6.

Specimens examined. UNITED STATES. Arizona. Cochise Co.: Sonoita Valley near Deserted Rancho (probably near the middle of the eastern base of the Huachuca Mts.), *Wright 965* (GH, NY, PH, US). Pima Co.: Dry southern slope near trail to top of Mt. Baboquivari, 5200 ft., *Gould, Darrow & Haskell 2725* (CAS, MO, US); west slope, Baboquivari Mts., 3000–4500 ft., *Gentry 3450* (CAS) Santa Cruz Co.: Patagonia Mts., *Peebles & Harrison 4740* (US); Patagonia Mts., 4500 ft., *Kearney & Peebles 14815* (CAS, UC); Nogales to Ruby, 4700 ft., *Kearney & Peebles 14918* (GH, POM, NY, US); Sonoita Valley, 4600 ft., *Rothrock 685* (F , GH, NY, PH, US).

MEXICO. Sonora: Pineland burned June 1939, Puerto de los Aserraderos, region of Río Bavispe, *White 3008* (GH); oak grasslands, Cañon del Agua Amarga, region of Río Bavispe, *White 3626* (GH) (for map see White 1948); gravelly slope in the Sierra Batuc, 8 mi. n.e. of Mátape on the road to Batuc, 3300 ft., *Wiggins & Rollins 424* (DS, NY); xeric oak slope, Sierra de Alamos, 3500 ft., *Gentry 4894* (DS, GH, MO, NY); Sierra de Alamos, *Rose, Standley & Russell 12816* (NY, US). Chihuahua: Guayanopa Cañon, Sierra Madre, 3600 ft., *M. E. Jones*, 1903 (DS, POM, US); Río Aros, *LeSueur 1348* (F); Río Benito, *LeSueur 695* (F, GH, MO, TEX); Hacienda San José, 25 mi. south of Batopilas, *Palmer 55*, 1885 (GH, MEXU, NY, PH, US); oak slopes and flats, Guasaremos, Río Mayo, *Gentry 2414* (A, F, MO, UC, US). Jalisco: Near Guadalajara, *Rose & Painter 7353* (NY, US); hillsides near Guadalajara, *Pringle 2873* (GH); barranca of Guadalajara, *Rose & Painter 8027* (US), *Rose & Hough 4826* (US), *Pringle 9773* (GH, MO, NY, US), *Pringle 11434* (GH, US); rocky slopes near top of Barranca de los Oblatos (Barranca Grande or Barranca of Guadalajara) below and near road to Los Baños, about 5 mi. north of Guadalajara, *Moore & Wood 4818* (GH, UC, Bailey Hortorium); barranca near Guadalajara, *Pringle 4451* (GH, MEXU, NY, MO, PH, UC, US); Río Blanco, *Palmer 220* (part), 1886 (GH, NY, US), *594*, 1886 (GH, MEXU, MO, NY, PH, US); vicinity of La Venta, Lake Chapala, *Lemmon & Lemmon*, 1905 (UC).

Collections of this species from the region of Guadalajara, Jalisco, have been designated *Cracca calva* Rydb. These plants supposedly differ from typical *Tephrosia leiocarpa* in having "calyx lobes distinctly longer than the tube; wing petals obliquely obovate," rather than "calyx lobes about equalling the tube; wing petals oblong." The calyx-lobes of *C. calva* are noted as subulate, 4 mm. long, the tube 2.5–3 cm. [mm!], while the lobes of *T. leiocarpa* are lanceolate, 3 mm. long, the tube 2.5–3 mm. long. Neither of these characters can be applied with any degree of satisfaction. In all the material I have seen, the wings of the corolla are very nearly identical, exhibiting parallel variations. The ratio of calyx-lobes to tube has proved throughout the genus to be rather inconsistent, so that it has been used as little as possible as a taxonomic character in this study. The present species seems to be no exception, for the calyx-lobes of some specimens from both areas exceed the tube. It should also be noted that the upper, lateral and lowermost lobes are all of different lengths.

Many calyces from the northern area are nearly cylindric, while most of those from Jaliscan material are campanulate. Unfortunately, however, neither the shape of the calyx nor the

length of the calyx-lobes is constant; the ranges of the latter are given below:

	Calyx-length	*Upper lobes*	*Lateral lobes*	*Lowermost lobe*
Arizona, Sonora, Chihuahua	4.5–6 mm.	1–2 mm.	2–3.5 mm.	3–4.5 mm.
Jalisco	5–5.5 mm.	2–2.5 mm.	3 mm.	4–4.5 mm.

These extremes in themselves can hardly be considered significant as distinguishing characteristics, and not enough individual plants are available to determine the differences between the two areas statistically.

The only differences evident in the Jaliscan specimens are tendencies toward slightly longer peduncles of the inflorescences, the occasional occurrence of a leaf at the first node of the inflorescence, slightly longer calyx-lobes than in many northern specimens and a more nearly campanulate calyx. These do not, however, seem to constitute sufficient bases for the retention of *Cracca calva* as a separate entity in spite of the apparent disjunction in the range between Chihuahua and Jalisco.

6. **Tephrosia Conzattii** (Rydb.) Standl.

Cracca Conzattii Rydb. N. Amer. Fl. **24:** 162. 1923. Las Sedas, Dist. Etla, Oaxaca, Mexico, *C. Conzatti 1786,* 19 May 1907 (US 474970-Type; NY).

Tephrosia Conzattii (Rydb.) Standl. Field Mus. Publ. Bot. **11:** 161. 1936.

Slender shrub, apparently reaching 3 m.; stems terete or angled, striate, the bark pale. Stems, axes of inflorescences, petioles, rachises and petiolules densely hirsutulous to short-strigose with fine cinereous or rusty hairs. Leaves 6–20 cm. long, the petioles (3–)7–20 mm. long, most often shorter than the lowermost leaflets, the rachis 4.5–16 cm. long, striate; stipules linear, acuminate, to linear-setaceous, 6–14 mm. long, 1.5 mm. or less wide, persistent; leaflets of the principal leaves 15–35(–37), linear to linear-oblong or occasionally oblong, the base acute or obtuse, the apex acute, obtuse or rounded, cuspidate-mucronate, 12–37 mm. long, 2.5–7 mm. wide, (3–)5–7 times as long as broad, thin, glabrous to moderately short-strigose or strigose above, strigose beneath with cinereous or, along the midrib and margins, rusty hairs. Inflorescences borne singly in the axils of leaves, usually leafless (rarely one node with a leaf), straight, the lowermost first and best developed, ascending, (3–)5–30 cm. long, usually equaling or exceeding the leaves, the peduncle 1.5–8.5 cm. long; flowering nodes 6–25, the nodes somewhat buttressed below, the buds 5–7 at a node, 3–5 of these flowering and 1 or 2 fruiting. Primary bracts linear, acumi-

nate, often persistent in fruit (although often broken in herbarium-specimens), 6–13 mm. long, 1 mm. or less wide; secondary bracts inconspicuous, linear-subulate, deciduous. Pedicels 5–11 mm. long, ascending, slender. Dried flowers 14–16 mm. long. Calyx 4.5–5.5 mm. long, densely short-strigose with tawny or rusty hairs, the upper lobes acuminate, 1.5–2 mm. long, the lateral narrowly deltoid, acuminate, 2.5–3 mm. long, the lowermost subulate-lanceolate, 4 mm. long. Corolla apparently rose, becoming carmine with age, the standard brownish on the back with fine silky hairs, the blade with a green spot at the base within; blade of the banner ovate to obovate, 14 mm. high, 10–11 mm. broad, the claw 2–2.5 mm. long; wings 14 mm. long, ca. 3–4 mm. wide, with a claw 2–2.5 mm. long and a conspicuous auricle; keel shallow, ca. 15 mm. long, the claw ca. 2–3 mm. long. Vexillary stamen coherent with the staminal tube for about 1/3 of its length, free at the base, with or without an angular callosity near the base. Ovary strigillose along the upper suture, sometimes sparsely so along the lower, otherwise glabrous; ovules 9–11. Legume nearly straight or slightly sinuate, the outer half curving slightly upward, 4–6.5 cm. long, 4.5–5.5 mm. wide, spreading, ascending or drooping, with short, scattered hairs along the upper suture, otherwise glabrous; seeds (4–)7-11, oval-reniform, 3.4–3.8 mm. long, 2.2–2.6 mm. wide, brown variegated with black, plump. Somatic chromosomes 22.

Distribution. Oak woods, 1400–2000 m., México, Guerrero and Oaxaca, Mexico. Map 4.

Specimens examined. MEXICO. México: Oak woods, Ypericones, Dist. Temascaltepec, *Hinton 6998*, 19 Nov. 1934 (F, GH, NY, US); barranca, Volcán, Dist. Temascaltepec, 1410 m., *Hinton 1297*, 9 Aug. 1932 (GH, MEXU, NY, US). Guerrero: Steep bluff and open moist slope, open ridge with sparse cover of low second-growth oak on loose granitic-conglomerate soil, summit of mountains n.e. of Chilpancingo on road to Chilapa, 1800–1900 m., *Moore & Wood 4650*, 19 Aug. 1948 (GH, UC, Bailey Hortorium). Oaxaca: Las Sedas, Dist. Etla, 2000 m., *Conzatti 1786*, 19 May 1907 (NY, US), *2520*, 29 Aug. 1909 (F).

The fifteen to thirty-five or thirty-seven narrow leaflets which are never broadest above the middle, the axillary inflorescences, the often persistent, linear bracts and the glabrous pods are characteristic. The species is most likely to be confused with *Tephrosia leiocarpa*, but is probably more closely related to *T. cuernavacana* which it resembles in its axillary inflorescences and glabrous legumes but from which it differs in bracts, leaflets and number of buds at a node of the inflorescence.

Although the leaflets of the Type are strigose above, the upper surfaces may be either glabrous or more or less strigose. The population studied near Chilpancingo, Guerrero, contains both forms, neither of which is associated with ecological differences.

In most specimens from the State of México the upper surfaces are glabrous. One plant of *Hinton 6998* (US), however, bears minute trichomes scattered on the upper surfaces.

7. **Tephrosia cuernavacana** (Rose) Macbr.

Cracca cuernavacana Rose, Contr. U. S. Nat. Herb. **12:** 269. 1909. "Wooded slopes of barranca above Cuernavaca, 6000 feet," Morelos, Mexico, *C. G. Pringle 6327*, 25 June 1896 (US 461989-Type; CAS, GH, MEXU, NY, PH, UC, US).

Tephrosia cuernavacana (Rose) Macbr. Field Mus. Publ. Bot. **4:** 87. 1925.

Erect suffrutescent perennial from a woody crown; stems simple or branched, monopodial, 6–10 dm. high, herbaceous or sometimes woody below. Stems, petioles, rachises and axes of inflorescences sparsely to densely strigillose to short-strigose or hirsutulous with whitish or rusty hairs. Principal leaves 5–13(–15) cm. long, spreading or ascending, the petiole 5–30 mm. long, longer or shorter than the lowermost leaflets, the rachis 4–11 cm. long; stipules linear to lanceolate, acuminate, 7–10(–13) mm. long, 1–2 mm. wide, persistent, green, ascending; leaflets of the principal leaves 13–29, oblong to elliptic-lanceolate, the apex rounded or somewhat truncate, with a slender mucro, the base rounded or obtuse; leaflets 14–32(–35) mm. long, 4–10(–11) mm. wide, 2–4 times as long as broad, thin, glabrous above, pale, thinly to moderately strigillose to strigose beneath with whitish hairs, the veins pale; petiolules 1–3 mm. long, slender. Inflorescences 2–5, terminating leafless axillary branches of either the main or secondary branches (the uppermost inflorescence sometimes apparently terminating the main axis but actually axillary and overtopping it), 3.5–9(–13) cm. long, ascending, usually exceeded by the leaves, the flowering nodes loosely grouped near the end, the peduncle 2–4(–7) cm. long, the flowering nodes 6–12, the lowermost rarely with a short, few-flowered branch in the axil of a bract; buds and flowers 2 at a node. Primary bracts lanceolate to ovate-lanceolate, acuminate, 7–15 mm. long, 2–5 mm. wide, about 7-veined, deciduous before anthesis, green and foliaceous; secondary bracts lanceolate to linear, 5–9 mm. long. Pedicels 4–7 mm. long, ascending, filiform, thickening somewhat in fruit, densely strigillose with brown hairs. Dried flowers 13–16 mm. long. Calyx 4–5 mm. long, densely strigillose to strigose with rusty-brown hairs, the lobes subulate, the upper 1.2–3 mm. long, the lateral 2.5–3.5 mm. long, the lowermost 3–4 mm. long. Corolla apparently white or pink, becoming pink, lavender or purplish, the banner with a green spot at the base of the blade; blade of the banner obovate to orbicular, 13–17 mm. high, 12–14 mm. wide, finely hairy on the back, the claw 2 mm. long; wings oblong, 14–15 mm. long, 3.5–4 mm. wide, slightly falcate with a distinct basal auricle, the claw 3.5–4 mm. long; keel 14–15 mm. long, the claw 2.5–3 mm. long. Staminal tube 9–10 mm. long, the vexillary stamen lightly adnate to the tube, occasionally coming free, flat, not thickened near the base. Ovary hirtellous along both sutures with rusty hairs, the valves

glabrous; ovules about 10. Legume nearly straight, about 4.5 cm. long, 5.5–6.5 mm. wide, spreading or ascending, hirtellous along the sutures or nearly glabrous, the valves glabrous, brown; seeds 4–9, the mature seeds not seen. Fowering collections from late June through August.

Distribution. Well-drained soils in open oak or pine woods, 1200–1900 m., Morelos, Guerrero and Michoacán, Mexico. Map 4.

Specimens examined. MEXICO. Morelos: Wooded slopes of barranca above Cuernavaca, 6000 ft., *Pringle 6327* (CAS, GH, MEXU, NY, PH, UC, US). Guerrero: Oak woods, Carrizeras, Dist. Mina, *Hinton 10485* (F, GH, MO, NY, US). Michoacán: Woods, Puerto Zarzamora, Dist. Coalcomán, *Hinton 15051* (GH, US); open pine forests, rocky cliffs at Las Baranquillas, Apatzingán, 4000 ft., *Leavenworth & Hoogstraal 1789* (F); common in open, well-drained situations near falls 7 mi. s.w. of Uruapan, 6000 ft., *Leavenworth & Hoogstraal 1249* (F, MO); brownish-red clay loam, open pine woods on road from Tancítaro to Apatzingán, Municipalidad Tancítaro, 5000 ft., *Leavenworth 628* (F); steep slope under pines, just above Tacámbaro on highway to Pátzcuaro, 5500 ft., *Moore & Wood 4035* (GH, Bailey Hortorium), *4843* (GH, UC, Bailey Hortorium).

The combination of axillary inflorescences with two flower-buds at a node, lanceolate primary bracts and glabrous pods is quite unique. This species appears to be most closely allied to *Tephrosia Conzattii*.

As another example of the difficulties involved in pubescence-characters in this genus, it is interesting to note that both appressed and spreading pubescence is found on the stems of specimens from a single collection, *Hinton 15051*. Individuals of both types also occurred in the colony observed at Tacámbaro, Michoacán.

8. **Tephrosia leucantha** HBK.

Tephrosia leucantha HBK. Nov. Gen. et Sp. (folio) **6:** 360. pl. 577. Aug. 1824; Op. cit. (quarto) **6:** 460. pl. 577. Sept. 1824. Near Guanajuato, Mexico, ca. 2000 m., *Humboldt & Bonpland*, Sept. 1803.

Cracca leucantha (HBK.) Kuntze, Rev. Gen. **1.** 175. 1891.

Tephrosia leucantha var. *acuta* M. E. Jones, Contr. West. Bot. **12:** 7. 1908. San Diego Canyon, Sierra Madre, Chihuahua, Mexico, 6400 ft., *M. E. Jones*, 16 Sept. 1903 (POM-Type; DS).

Cracca Roseana Rydb. N. Amer. Fl. **24:** 164. 1923. "Hacienda del Ciervo," between San Juan del Río and Cadereyta, Querétaro, Mexico, *Rose, Painter & Rose 9642*, 20 Aug. 1905 (NY-Type; GH, MEXU, US).

Tephrosia Roseana (Rydb.) Standl. Field Mus. Publ. Bot. **11:** 161. 1936.

Erect or somewhat decumbent herbaceous or suffrutescent perennial from a woody crown and thick woody roots up to 1 m. long; stems 3–6 dm. high, simple or with axillary branches up to 2.5 dm. long, these sometimes branching. Stems, petioles, rachises and axes of inflorescences

strigillose to hirsutulous with antrorsely directed white to rusty hairs. Leaves 6–15 cm. long, the petiole 4–25 mm. long, most often shorter than the lowermost leaflets, the rachis 6–11 cm. long; stipules linear, acuminate, 7–12 mm. or less long, 1 mm. or less wide, persistent; leaflets of the principal leaves 13–29, linear-oblong, oblong-lanceolate or oblong, the base rounded, the apex obtuse, mucronate, (9–)12–35 mm. long, (3–)4–10(–13) mm. wide, 3–5(–7) times as long as broad, the terminal leaflet equal to or smaller than the lateral; leaflets thin, dull, almost glabrous or (usually) thinly strigillose to hirsutulous above with whitish hairs, pale beneath and strigillose to hirsutulous, the hairs along the midrib sometimes rusty, the veins pale, the leaflets appearing canescent, often with whitish margins; petiolules slender, 1–2 mm. long, densely strigillose to hirsutulous with fine cinereous or rusty hairs. Inflorescences terminating the principal stems and axillary branches, 2–15 cm. long the peduncle 0.2–5 cm. long, sulcate, angled, the flowering nodes 6–15, crowded at first, the internodes elongating with age, the nodes prominent, buttressed below the pedicels; buds and flowers 2 at a node, the flowers opening from below, apparently both of a pair at the same time. Primary bracts lanceolate, acuminate, the base acute, (5–)6–12 mm. long, 2–4 mm. wide, ca. 7-nerved, usually deciduous at anthesis; secondary bracts 2–9 mm. long, 1 mm. or less wide, linear, acuminate, 3-veined. Pedicels 5–9 mm. long, ascending, slender, thickening in fruit. Dried flowers 13–16 mm. long. Calyx 3.5–5 mm. long, densely strigillose to hirsutulous with brown or rusty hairs, the lobes subulate (the lateral rarely narrowly triangular), the upper often almost completely fused together, 1–2.5 mm. long, the lateral (2–)3–5 mm. long, the lowermost (2–)3.5–6 mm. long. Corolla white, becoming rose-purple or violet, the banner with a greenish spot at the base, the petals brown in most dried specimens; blade of the banner obovate to orbicular, 12–14 mm. high and wide, finely hairy with rusty hairs on the back, the claw 3.5 mm. long; keel 15–16 mm. long, slightly auricled, the claw 2.5–3 mm. long. Staminal tube 12–13 mm. long, the vexillary stamen coherent with the tube for about 1/3 of its length, with a prominent 2–3-lobed callosity on the upper side near the base. Ovary densely strigillose or short-strigose with tawny or rusty hairs. Legume nearly straight, curving slightly upward near the end, 3.5–5.5 cm. long, about 5 mm. wide, spreading or drooping, densely hirsutulous, rarely strigillose, the hairs rusty or tawny, at least along the margins; seeds 7–9, reniform-oblong, brown to gray, variegated with black, 4–4.4 mm. long, 2.8–3.2 mm. broad.

Distribution. Western and southern Chihuahua, western Tamaulipas, Zacatecas, Durango, Jalisco, Guanajuato and Querétaro, Mexico, apparently at 1500–1800 m. northward and 2000–2500 m. southward.

Specimens examined. MEXICO. Chihuahua: Guayanopa Cañon, Sierra Madre, Dist. Madera, 6000 ft., *M. E. Jones*, 1903 (MO); San Diego Cañon, Sierra Madre, Dist. Madera, 6400 ft., *M. E. Jones*, 1903 (DS, POM); Sierra Madre near Colonia Garcia, *Townsend & Barber* 367 (GH, MO, NY, US); 3 mi. south of Rubio, Cusihuiriachic, *Shreve 7985* (F, GH, US); rocky hills near Cusihuiriachic, *Pringle 2006* (MO, NY, PH, UC,

US); Guajochic, *Hartman 554* (GH, PENN, US). Durango: Tejamén, *Palmer 487*, 1906 (F, GH, NY, UC, US). Zacatecas: Zacatecas, 7000 ft., *Kuntze 23410* (NY); Zacatecas, 7000–8000 ft., *Purpus*, Aug. 1903 (UC), rocky slopes, Dec. 1903 (UC); Zacatecas market, *Palmer 745*, 1898 (GH, US). Jalisco: On rocky slopes near Ojuelos, Lagos, 6500 ft., *Shreve 9300* (GH, PH, UC). Guanajuato: Guanajuato, *Dugès* (US); west-facing slope with dense oak woods on shaly soil between Valenciana and Santa Rosa, km. 11–12 on road from Guanajuato to Dolores Hidalgo, 8000 ft., *Moore & Wood 4790*, 29 Aug. 1948 (GH, UC, Bailey Hortorium). Querétaro: Hacienda del Ciervo, *Rose, Painter & Rose 9642*, 20 Aug. 1905 (GH, MEXU, NY, US); Del Ciervo al cerro de la mesa, *Altamirano 1564*, 20 Aug. 1905 (MEXU, US). Tamaulipas: Tula, *Viereck 560*, June 1930 (US).

The specimens included here under *Tephrosia leucantha* are from widely scattered localities and show considerable variation. Those from the Sierra Madre of Chihuahua and the region of Cusihuiriachic are very much alike in appearance and the single flowering collection from this region has somewhat shorter and broader calyx-lobes and shorter bracts than other specimens examined. *Tephrosia leucantha* var. *acuta* M. E. Jones is referred here. Material from southern Chihuahua and Zacatecas is also very uniform, while that from Tejamén, Durango, is different in being very much branched, with the pubescence of the legume tightly appressed. The Jaliscan collection also has appressed pubescence and, in addition, very narrow leaflets only 3–4 mm. wide. The plant from Querétaro described as *Cracca Roseana* Rydb. has appressed pubescence and is not as rusty brown as some other plants, while the calyx-lobes are slightly longer than in most of the more northern examples. This plant differs from specimens from the type-locality of *Tephrosia leucantha* primarily in the denser, more tightly appressed, paler pubescence.

If a recognizable geographical trend is present in this species, it would appear to be toward shorter, broader, less attenuate calyx-lobes and shorter bracts in the northern portion of the range. Additional collections may, therefore, indicate the need for modification of *T. leucantha* in the sense here used. All of these plants, however, share in common the subulate calyx-lobes, lanceolate bracts, vexillary stamen with a thickening near the base and coherent with the staminal tube, terminal and axillary inflorescences with paired buds at each node, antrorse pubescence and tawny- or rusty-haired pods.

A Jones collection from Guayanopa Canyon, Sierra Madre, Chihuahua, 24 September 1903, made at the same time as the Type of *Tephrosia leucantha* var. *acuta*, is intermediate between *T. leucantha* and *T. leiocarpa*, also collected at this locality. It has the shrubby habit of the latter, an intermediate leaflet-shape, minutely strigillose leaflets and stems and strigillose legumes.

9. **Tephrosia Thurberi** (Rydb.) comb. nov.

Cracca Thurberi Rydb. N. Amer. Fl. **24:** 165. 1923. Mububi, Sonora, Mexico, *Thurber,* June 1851 (Distribution No. 410, in part) (NY-Type; MO, NY; GH-probable isotype).

Tephrosia Thurberi A. Gray, MS. in herb.; Rydb. in syn., N. Amer. Fl. **24:** 165. 1923.

Erect perennial herb 5–6 dm. high; stems 1–several from a woody crown, slightly woody at the base, monopodial, mostly simple or with one or several axillary branches. Stems, axes of inflorescences and pedicels doubly pubescent with rusty or pale hairs: both hirtellous with fine, strongly retrorse hairs and hirsutulous with coarser hairs which curve downward and outward; petioles and rachises hirtellous and hirsutulous with either retrorse or antrorse hairs. Principal leaves 10–17(–22) cm. long, the petiole 9–35(–40) mm. long, shorter or longer than the lowermost pair of leaflets, the rachis (4–)6–12.5(–16.5) cm. long; stipules linear, long-acuminate, to subulate, 10–12 mm. or less long, 1 mm. wide, becoming brown, usually persistent; leaflets of the principal leaves 9–31, mostly oblong to linear-oblong or elliptic, the base and apex rounded, rarely acutish, mucronate, 15–38(–43) mm. long, 6–12(–16) mm. wide, 2–3(–4) times as long as broad, hirtellous to hirsutulous above, hirsutulous to hirsute below; petiolules 1–2.5 mm. long, slender, densely hirsutulous. Inflorescences terminal or sometimes 1 (rarely more) axillary, 5–18 cm. long, erect, the flowers densely crowded at first, the internodes elongating during anthesis and in fruit, the flowering portion at anthesis 2–6(–10) cm. long, the flowering nodes usually 10–30, buttressed below; buds and flowers 2 at a node, anthesis proceeding centrifugally. Primary bracts linear to linear-lanceolate, acuminate, 7–13 mm. long, rarely more than 1.2 mm. wide, deciduous; secondary bracts linear-setaceous, 9 mm. or less long, deciduous. Pedicels 7–10(–11) mm. long, ascending, slender in flower, thickening in fruit, often with a setaceous bracteole. Dried flowers 14–18 mm. long. Calyx 5–6 mm. long, both hirtellous and hirsutulous to hirsute with rusty hairs, the lobes subulate, attenuate, with a broad U-shaped sinus between the upper and lateral lobes, the upper lobes 1.5–2 mm. long, the lateral 3–4 mm. long, the lowermost ca. 5 mm. long. Corolla apparently white, becoming lavender or purplish, the base of the blade of the banner with a green spot; blade of the banner oval to obovate or orbicular, 13–16 mm. high, 11–15 mm. broad, the apex retuse, densely silky-hirsutulous with brown hairs on the back, the claw ca. 3 mm. long; wings 14–16 mm. long, with an acute auricle, the claw 4–5 mm. long; keel

14–15 mm. long with a claw 3–3.5 mm. long. Vexillary stamen with a prominent 2-lobed callosity on the upper side near the base. Ovary densely hirsutulous. Legume nearly straight, 3–6 cm. long, 3.5–4.5 mm. wide, spreading, densely hirsutulous with rusty hairs; seeds 5–10, mature seeds not seen. Flowering collections from late May and June (Thurber) but primarily from late July to early September.

Distribution. Oak and pine woods, mostly between 1300 and 1900 m., southern Arizona, northern Sonora, and southwestern Chihuahua. Map 16.

Specimens examined. UNITED STATES. Arizona. Southern Arizona, 1881 (GH). Pima Co.: near Tucson, *Bottimer 306* (US). Pima or Santa Cruz Co.: Santa Rita Mts., 4500 ft., *M. E. Jones*, 1903 (MO), *Pringle*, 1884 (CAS, F, GH, MO, NY, PENN, PH, POM, US). Santa Cruz Co: Sonoita Valley, 6500 ft., *Rothrock 625* (F, GH, PH, US); Patagonia Mts., *Peebles, Harrison & Kearney 5597* (US), *Kearney & Peebles 10190* (UC, US). Cochise Co.: Ruckey Valley, south peaks of Chiricahua Mts., 9–10000 ft., *Lemmon*, 1881 (F); Ft. Huachuca, *Wilcox*, 1893 (NY), 1894 (NY); Huachuca Mts., *Harrison & Kearney 5792* (US), *Holzner 1732* (US); Huachuca Mts., 6000 ft., *M. E. Jones*, 1903 (POM, UC), 5500 ft., 1903 (US); Miller Canyon, Huachuca Mts., *M. E. Jones*, 1929 (CAS, GH, POM); Ramsey Canyon, Huachuca Mts., *M. E. Jones*, 1929 (MO, NY); open hill tops, Ramsey Canyon, Huachuca Mts., *Gooding 751* (NY, US).

MEXICO. Sonora: Mububi, *Thurber 410* (part) (MO, NY); between Fronterus and Mububi, *Thurber 410* (part) (GH); Bubacomori (Babocomari?), *Thurber 1009* (GH, NY); between Barbocomori and Santa Cruz, *Wright 964* (GH, MO, NY, PH, UC, US); Sierra Verde, *Schott*, Aug. 1855 (F, NY, US); Cerro del Capulin, n.w. of Aribabi, loop of the Río Bavispe, 6100 ft., *White 2706* (GH, US); Cañon Internacional, region of the Río Bavispe, *White 3502* (GH); pineland burned over June 1939, Puerto de los Aserraderos, region of the Río Bavispe, *White 3225* (GH, SMU) (For exact locations, see White (1948)). Chihuahua: Mojarachic, *Knobloch 5576* (F); open pine slope, Sierra Charuco, Río Fuerte, *Gentry 2314* (F, GH, MEXU, MO, UC, US) (see Gentry (1942) for map.).

The narrow, linear to linear-lanceolate acuminate primary bracts (rarely more than 1.2 mm. wide) contrast strikingly with the lanceolate acuminate primary bracts (2–3 mm. wide) of *Tephrosia leucantha*, with which this species has been identified. An additional striking character is supplied by the pubescence of the stems, axes of the inflorescences and pedicels, which in *T. Thurberi* are both hirtellous with strongly retrorse hairs and hirsutulous with coarser hairs which curve downward and outward. In *T. leucantha*, however, the same parts are strigillose to hirsutulous with antrorsely directed trichomes. Since the primary bracts of both species are deciduous at anthesis or soon

thereafter, the very different induments make possible the accurate identification of fruiting specimens. The more westerly and northerly range of *T. Thurberi* is also noteworthy.

Rydberg designated as cotypes both flowering and fruiting specimens (NY). The flowering specimen which clearly shows the narrow bracts should stand as the Type. Unfortunately the plants distributed as *Thurber 410* comprise several collections made in May and June, 1851, at Fronterus, Mububi or intermediate localities in Sonora so that some of the specimens bearing this number do not represent the type-collection, although they are this species and are perfectly characteristic.

10. **Tephrosia virginiana** (L.) Pers.

Cicer Astragaloides (forte) *Virginianum,* hirsutie pubescens, floribus amplis, subrubentibus, Pluk. Phytogeogr. pl. 23, fig. 2. 1692; Almagest. 103. 1696.

Vicia foliis pinnatis abruptis Gronov. Fl. Virgin. 83. 1743; ed. 2, 106. 1762.

Cracca virginiana L. Sp. Pl. **2:** 752. 1753, as to syn. Pluk. Almagest. and Herb. L. (GH-photograph of Type: *Galega,* Sheet 4, in Herb. L.)

Galega virginiana L. Syst. Nat. ed. 10. **2:** 1172. 1759, as to name, not plant.

Galega virginica J. F. Gmel. Syst. Nat. 1552 (index). 1791.

Tephrosia virginiana (L.) Pers. Syn. Pl. **2:** 329. 1807.

Tephrosia virginica (L.) Bigel. Fl. Bost. ed. 2. 278. 1824.

Tephrosia holosericea Nutt. Jour. Acad. Phila. **7:** 105. 1834. "In the plains of Arkansas." (PH-specimen marked "*Tephrosia *holosericea* Nutt. Arkansas (T. Nuttall)" and a fragment, apparently part of the same plant, marked "Arkansas, Dr. Pitcher.").

Tephrosia virginiana γ *holosericea* (Nutt.) T. & G. Fl. N. Amer. **1:** 296. 1838.

Cracca virginiana holosericea (Nutt.) Vail, Bull. Torr. Cl. **22:** 27. 1895.

Cracca holosericea (Nutt.) Britt. & Bak. Jour. Bot. **3:** 16. 1900.

Tephrosia virginiana β *glabra* Nutt. ex T. & G. Fl. N. Amer. **1:** 296. 1838. "Georgia, *Nuttall.*"

Cracca latidens Small, Fl. Southeastern U. S. 609, 1331. 1903. Vicinity of Eustis, Lake County, Florida, *G. V. Nash 1072,* 16–30 June 1894 (NY-Type; GH, MO, NY, PH, UC, US).

Tephrosia latidens (Small) Standl. Field Mus. Publ. Bot. **11:** 161. 1936.

Cracca leucosericea Rydb. N. Amer. Fl. **24:** 163. 1923. On the Washita, between Fort Cobb and Fort Arbuckle, *E. Palmer 114,* 1868 (NY-Type; NY, US).

Tephrosia leucosericea (Rydb.) Cory, Rhodora **38:** 406. 1936.

Cracca Mohrii Rydb. N. Amer. Fl. **24:** 163. 1923. Near Eucheeana, Walton County, Florida, *C. Mohr,* June 1880 (US 773335-Type; US).

Erect perennial herb from a branched woody crown and long slender tough woody roots; stems one to several from each branch of the crown, (2–)3–7 dm. high, monopodial, sometimes with weak axillary branches up to 17 cm. long, nearly terete or obtusely angled. Stems, petioles and rachises sparsely to densely strigillose, strigose, hirtellous, hirsute or villous with fine cinereous or whitish hairs. Leaves 5–14 cm. long, ascending, the petioles principally 1–6(–9) mm. long, those of the lower leaves sometimes 9–12 mm. long, shorter than the lowermost leaflets; lower stipules oblanceolate to linear, the upper linear-lanceolate to subulate, 8–11 mm. or less long, becoming brown, often deciduous; leaflets of the principal leaves 9–31 (or in some plants of northern Florida –39), predominantly 15–25, elliptic to linear-oblong, the base and apex rounded to acute, mucronate, 11–31(–33) mm. long, (2–)4–8(–10) mm. wide, 2–7 times as long as broad, the terminal leaflet often smaller than the lateral and somewhat cuneate or retuse; leaflets dull, thin, bluish- to yellowish-green, glabrous or sparsely to densely strigillose to densely hirsutulous above, sparsely to densely strigillose or hirtellous to hirsute below with fine white or cinereous hairs, appearing woolly or silky, the veins often reddish below; petiolules 0.5–1.5 mm. long. Inflorescences terminating the principal axes (or axillary branches sometimes with a few flowers), either very short-peduncled or the lower 1–6 flowering nodes with leaves, the flowering nodes 7–20 or more, often crowded and buttressed below; buds 2(–3) at a node, of these 2 or very rarely 3 flowering and fruiting, anthesis proceeding centrifugally, the inflorescence elongating in fruit. Primary bracts linear-lanceolate, long-acuminate, to subulate, 8–13 mm. long, 0.5–1.7 mm. wide, often with 1 or 2 teeth, deciduous at anthesis; secondary bracts linear-subulate, 4–6 mm. long, deciduous. Pedicels 4–17(–20) mm. long, ascending, slender, thickening in fruit, sometimes bearing 1–3 bracteoles. Dried flowers 14–21 mm. long. Calyx (4–)5–10 mm. long, strigillose to densely strigose or hirtellous to densely hirsute with long soft spreading hairs, the upper lobes lance-subulate to narrowly deltoid, short to long-acuminate, (2–)3–5(–6) mm. long, the lateral lobes ovate to lanceolate, short- to long-acuminate, (3–)4–6.5 mm. long, the lowermost ovate to lanceolate, short- to long-acuminate, (2–)4–7.5 mm. long. Corolla usually bicolored, the banner lemon-yellow to cream-colored without, cream to white within, the wings and keel rose, rarely white, the petals often brown in dried specimens; banner with an abrupt, short claw or the blade tapering into a claw about 3 mm. long, the blade orbicular to broadly ovate, 14–19 mm. high and broad, finely strigillose or hirtellous on the back; wings 15–20 mm. long, auricled, the claw 2–3 mm. long; keel 14–15 mm. long, nearly semi-circular, with or without an auricle, the claw 2–3 mm. long. Vexillary stamen coherent with the staminal tube for about 1/3 of its length, often bent near the base, sometimes broadened and thickened, the staminal tube 10–13 mm. long. Ovary densely strigillose to strigose with fine cinereous hairs; ovules 8–11. Legume straight to slightly downwardly falcate, (2.5–)3.5–5.5 cm. long, (3.5–)4–5.5 mm. wide, horizontal or ascending, stramineous to dark brown, sparsely strigillose to densely strigose or

hirtellous to densely hirsute or villous with long, soft, white or cinereous hairs; seeds 6–11, bean-shaped, oblong to subreniform in outline, 3.2–4.2 mm. long, brown, variegated with black. Somatic chromosomes 22. Flowering collections principally from mid-April through May at the southern edge of the range and from late June through July in the north.

Distribution. Well-drained, open, circumneutral to acid, non-calcareous soils in oak or pine woods, on ridges and prairies from Hillsborough County, New Hampshire, south to Hernando, Lake and Orange Counties, Florida, westward to St. Croix County, Wisconsin, Kiowa County, Kansas and Bailey and DeWitt Counties, Texas, United States; also in extreme southern Ontario, Canada. Map 7.

Specimens examined. Approximately 1000 specimens of this species have been examined. Since *Tephrosia virginiana* cannot be confused with any other species of the genus in the United States, for most part only specimens to indicate the northern and western edges of the range are cited. All of the collections from Florida, Alabama, Mississippi and Louisiana are cited, however, because of the relatively small amount of material from these areas and the consequent desirability of bringing these records together in one place.

CANADA. Ontario. Norfolk Co.: Normandale, *Frs. Victorin, Germain & Dominique 46865* (GH); St. Williams, *Frs. Victorin & Germain & E. Jacques 45867* (GH).

UNITED STATES. New Hampshire. Hillsboro Co.: Merrimack, *Batchelder*, 1918 (F); Nashua, *Robinson 778* (GH); Manchester, *Provost*, 1935 (NY). Massachusetts. Middlesex Co.: Lowell, *Beattie*, 1927 (OKL, POM). Franklin Co.: Sunderland, *Seymour 3421* (DUKE). New York. Albany Co.: Londonville, *House 21577* (DUKE, GH, NY, US). Broome Co.: Chenang River, Port Crane, *Millspaugh* (F). Seneca Co.: Junius, *Wiegand & Manning 16658* (MO). Ohio. Erie Co.: Oxford, *Moseley*, 1903 (F); Castalia cemetery, *Moseley*, 1896 (US). Lucas Co.: *Pontius & Bartley*, 1934 (US). Wood Co.: Liberty Twp., *Shanks*, 1939 (NY). Michigan. Kent Co.: Grand Rapids, *Shaddick*, 1895 (US), *Rush*, 1935 (NY). Livingston Co.: Hamburg, *Ehlers 6026* (UC); Buck Lake, *Ehlers 1487* (GH). Muskegon Co.: Muskegon, *Anderson*, 1939 (MO). Washtenaw Co.: Pickerel Lake, Dexter Twp., *McVaugh 7579* (GH). Wisconsin. Portage Co.: Plover, *Schuette*, 1888 (F, US). Rock Co.: Beloit, *Wadmond 16034* (KY). Trempeleau Co.: Trempeleau, *Fassett 4371* (DUKE). Minnesota. Without locality, *Holzinger*, 1890 (US). Winona Co.: Winona, *Hasse*, 1882 (NY).

Iowa. Allamakee Co.: 7 mi. south of New Albin, *Hayden 10306* (ISC). Buchanan Co.: Rowley, *Pammell*, 1902 (ISC). Johnson Co.: Iowa City, *Hitchcock*, 1889 (F, KSA); n.w. of Oxford, *Shimek*, 1923 (WVA). Lee Co.: Sec. 28, T67N R5W, *Fults*, 1931 (ISC). Muscatine Co.: Muscatine, *Tolstead*, 1934 (UC). Missouri: Jackson Co.: Sheffeld, *Bush 5846A* (GH). Johnson Co.: Warrenburg, *Steyermark 24592* (F, MO). Lewis Co.: LaBelle, *Steyermark 25732* (F). Macon Co.: Elmer, *Steyermark 40556* (MO). Putnam Co.: Livonia and Unionville, *E. J. Palmer 41101*

(MO). Kansas. Barton Co.: *Imler & Rydberg 1304* (KSA). Clay Co.: Clay Center, *C. Weber 146* (KSA). Cloud Co.: *S. Fraser*, 1930 (KSA). Douglas Co.: *Hitchcock*, 1899 (KSA). Ellsworth Co.: Carneiro, *Bondy 390* (FLAS, OKL); Kanopolis, *Becker*, 1896 (KSA). Kiowa Co.: Greensburg, *B. Smyth 2117* (KSA). Pottawatomie Co.: St. George, *Carleton & Reed*, 1893 (KSA). Stafford Co.: near St. John, *Maupin*, 1934 (KSA).

Oklahoma. Beckham Co.: Sayre, *Hart 56* (OKL). Comanche Co.: Ft. Sill, *Clements 11636* (GH); Wichita Mts., *McMurry 690* (OKL). Roger Mills Co.: *J. Engelman 1597* (OKL). Woodward Co.: Mooreland, *M. Rogers 251* (OKL); *Hyde*, 1944 (OKL). Texas. Bailey Co.: Coyote Lake, *Ferris & Duncan 3474* (DS). Callahan Co.: Clyde, *E. J. Palmer 13823* (TENN). Comanche Co.: Comyn (TEX). Dewitt Co.: western part, *Riedel*, 1942 (TEX). Erath Co.: mi. north of Morgan, *Tharp*, 1941 (GH); *L. Gough*, 1921 (TEX). Guadalupe Co.: Sullivan, *E. J. Palmer 11655* (GH); 13 mi. south of Seguin, *Erlanson 108* (GH), *106* (US). Lamb Co.: 8 mi. south of Olton, *Cory 13506* (GH). Lubbock Co.: Lubbock, *Whitehouse*, 1929 (TEX), *Reed 3051* (US). Montague Co.: *Tharp 2897* (TEX, US).

Louisiana. Natchitoches Parish: Natchitoches, *E. J. Palmer 8016* DS, MO, US). Rapides Parish: 25 mi. south of Alexandria, *Erlanson 134* (US); 7 mi. west of Woodworth, *D. & H. Correll 9713* (DUKE). Mississippi. Attala Co.: west of Kosciusko, *C. A. & U. Weatherby 6293* (GH, NY, PENN, US). Clarke Co.: Enterprise, *Tracy 3298* (NY). Forrest Co.: Hattiesburg, *Drushel 8407* (MO). Harrison Co.: *Woodson & Anderson 1580* (MO). Jones Co.: Laurel, *Tracy 3351* (NY). Pearl River Co.: 10 mi. west of Poplarville, *Erlanson 161, 162* (US).

Alabama. Cullman Co.: Cullman, *Sudworth*, 1891 (US). Jackson Co.: Bryant, *Porter*, 1934 (GH); Racoon (Sand) Mt., *Wherry*, 1933 (PENN). Jefferson Co.: Birmingham, *Moore L6* (MO). Lee Co.: Auburn, *Earle & Baker*, 1897 (F, MO, NY, US). Macon Co.: Tuskegee, *Drushel*, 1915 (MO). Marshall Co.: Guntersville, *Howell 815* (US). Mobile Co.: Mobile, *Mohr*, 1892 (US); 18 mi. north of Mobile, *Erlanson 186, 192* (US); 2 mi. north of Citronella, *Erlanson 198* (DUKE). Montgomery Co.: 1 mi. west of Maxwell Field, Montgomery, *Edwards*, 1932 (PENN). Shelby Co.: Calera, *Everts* (PH).

Florida. Clay Co.: 3 mi. south of Green Cove Springs, *Wood & Clement 7162* (GH); *Blanton 6330* (US); 0.5 mi. east of Penny Farms *Erlanson 273a* (US); Goldhead Branch State Park, *Murrill* (FLAS). Duval Co.: 8 mi. s.w. of Jacksonville, *Kime*, 1943 (FLAS). Gadsden Co.: Chattahoochee, *Knight*, 1942 (FLAS); 2 mi. east of Chatahoochee, *Erlanson 235, 235a* (US). Hernando Co.: *Buswell*, 1928 (MIAMI). Jefferson Co.: Monticello, *Nolan*, 1928 (FLAS). Lake Co.: Eustis, *Hitchcock*, 1894 (FLAS), *Nash 1072* (GH, MO, NY, PH, US). Leon Co.: *Kurz*, 1942 (FLAS). Liberty Co.: near Aspalaga, *Wherry*, 1930 (PENN). Marion Co.: Wiersdale, *West*, 1928 (FLAS); 1 mi. south of Oklawaha, *Erlanson 252* (US). Okaloosa Co.: Choctawatchee Forest, Crestview,

Knight, 1939 (FLAS); 6 mi. north of Ft. Walton, *Erlanson 219* (US), *220a* (GH, US). Orange Co.: 10 mi. n.e. of Orlando, *Blanton 6422* (CAS, DS, GH). Putnam Co.: Putnam Hall, *West & Arnold*, 1942 (FLAS); north of Palatka, *J. Davis*, 1933 (FLAS). Walton Co.: *Morrison*, 1933 (FLAS).

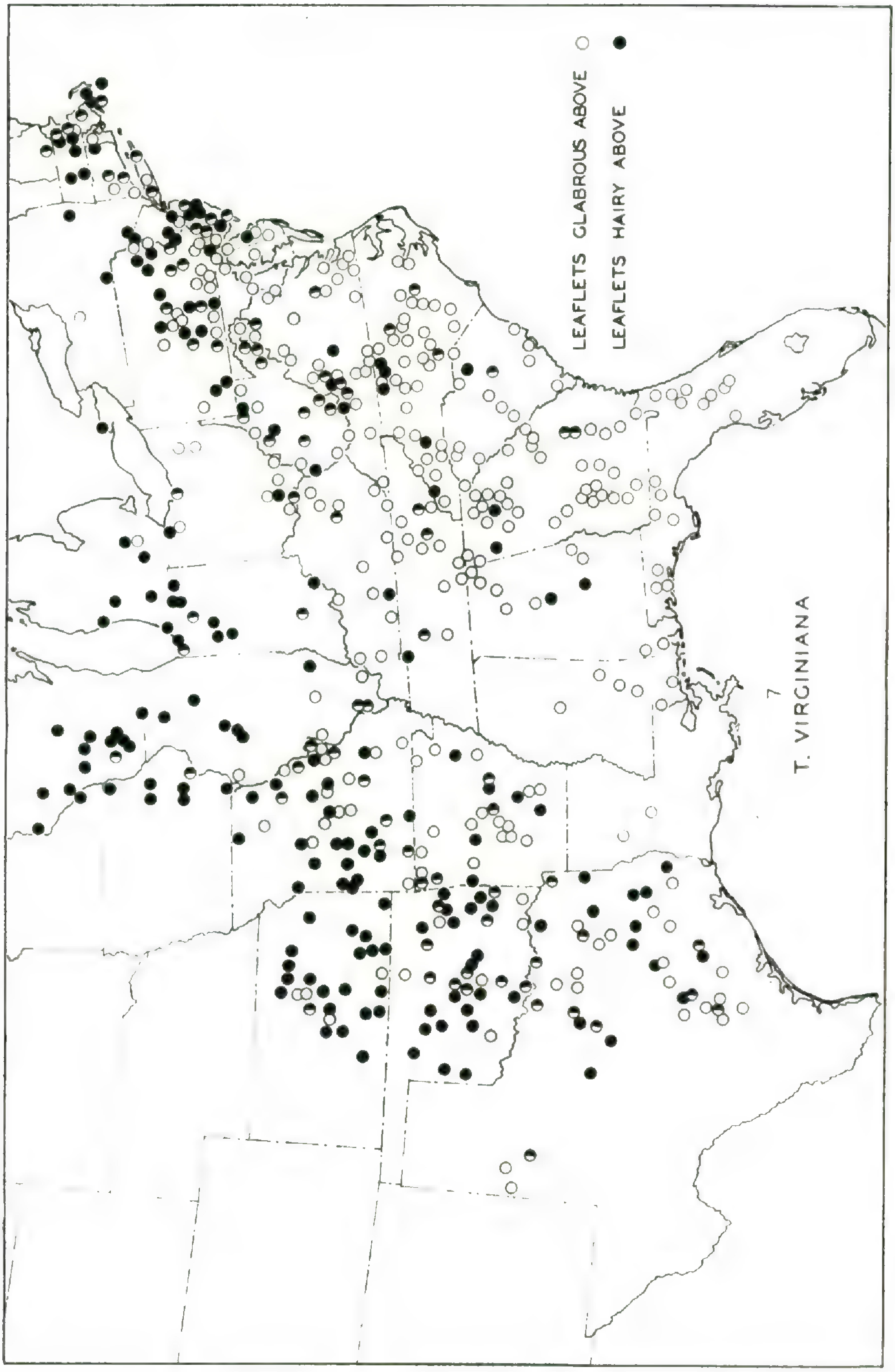
Although *Tephrosia virginiana* is easily distinguishable from the other species occurring in the United States, it is rather variable, particularly with respect to the number and length of the trichomes of the indument, their distribution and appressed or spreading character. A second variable feature is the calyx, the lobes of which are rather inconstant in both shape and length. Since both of these characters, as well as leaflet-shape, have been used as specific and varietal criteria, considerable time has been spent in an attempt to determine what importance may be assigned to these features of the plant.

Almost every possible gradation of hairiness, from few, evenly scattered trichomes to densely crowded trichomes, is encountered within the range of the species. It is quite impossible to delimit any of these phases, other than arbitrarily. No definite segregation of any type can be found. Similarly, the trichomes form a complete series from two-tenths to more than two millimeters long. There appears to be a general tendency for increasing length of hairs from south to north, but many exceptions occur.

In contrast to degrees of pubescence, the presence or absence of hairs on the upper surfaces of the leaflets is usually a clearly defined character. A few intermediates are found but, for the most part, the distinction is rather sharp with the leaflets either glabrous or with various densities of evenly distributed trichomes on the upper surfaces.[1] Both forms very often occur within the same colony and, indeed, are often represented on the same herbarium-sheet. Proportions of "hairy" and "glabrous" plants vary from colony to colony within any given area, seemingly to a large degree by chance. A few mass-collections made in the summers of 1947 and 1948 seem to bear this out.

It will, in addition, be noted from Map 7 that in herbarium-collections there is no real geographic segregation of either type, although more plants with glabrous leaflets are represented in the

[1] This separation into two types may, of course, be arbitrary, since the mode of inheritance of pubescence-characters and the effect of environment are unknown. A whole series of types may be involved, but it appears to be impossible to set up other distinctions at the present time.



Map 7. Distribution of TEPHROSIA VIRGINIANA. Half-filled circles indicate localities or collections from which both glabrous and hairy forms are known. See accompanying text.

southeastern area than elsewhere, while in the northwestern part of the range nearly all of the collections consist of hairy plants. Even though herbarium-specimens probably are not good samples of the populations involved, it seems reasonable on the basis of this material to postulate clines of increasing numbers of hairy

Mass Collections of *Tephrosia virginiana*

Locality	Plants with upper surfaces of leaflets glabrous*		Plants with upper surfaces of leaflets hairy*	
Botetourt Co., Va.	15	(67.5)	7	(32.5)
Roanoke Co., Va.	40	(100)	0	(0)
Montgomery Co., Va.	57	(83.7)	11	(16.1)
Wayne Co., N. C.	22	(95.3)	1	(4.4)
Richmond Co., Ga.	101	(100)	0	(0)
Emanuel Co., Ga.	58	(54)	48	(46)
Roane Co., Tenn.	70	(45.7)	83	(54.3)
Dickson Co., Tenn.	83	(76.2)	26	(23.8)
Prairie Co., Ark.	46	(40.4)	68	(59.6)
Gurdon Co., Ark.	8	(100)	0	(0)
Bowie Co., Tex.	7	(18)	32	(82)

* Figures in parentheses are percentage of either type.

plants from the Southeast, northward and westward, with local variations from one colony to another due to the fixation of either type. There is not, however, sufficient segregation of either glabrous or hairy forms to warrant taxonomic recognition of either entity on a geographical basis.

As in *Tephrosia onobrychoides, T. hispidula* and *T. florida,* the hairs on the leaflets may be either spreading or appressed. In this species, however, the distinction is often difficult to make with any degree of certainty although in the above-mentioned species the differences are very conspicuous. There are in *Tephrosia virginiana,* in addition, indications of an ecological influence, as well as that of the plant-press. On a single plant, the lower parts, which presumably develop during the cooler days of the growing season, often show spreading pubescence, while the upper portions bear distinctly appressed hairs. This is particularly evident in the more inland collections. In general, the northern specimens bear spreading pubescence while the southern plants have more appressed hairs. There appears, nevertheless, to be no definite segregation of either type. In the absence of other data it does not seem that much importance can be attached to this feature.

With this discussion as a background, the segregates from *Tephrosia virginiana* are considered below:

The name, *Tephrosia virginiana* var. *glabra* Nutt. ex T. & G., (described as "leaflets nearly glabrous when old"), has been applied to plants with very short and tightly appressed trichomes and to glabrous or glabrate plants (Fernald 1943, p. 452). However, no individuals with the stems, rachises or lower surfaces of the leaflets glabrous are represented in the numerous specimens examined, although many are indeed sparsely strigillose and by late summer the relatively long hairs of some plants may be broken off. This variety has been limited to the southeastern Coastal Plain, where thinly strigillose plants do occur. Plants with longer hairs, however, are also found there, while others which differ only in the greater density of the indument occur in Texas and Oklahoma. There is neither a morphological nor a geographical break.

Tephrosia virginiana var. *holosericea* (Nutt.) T. & G. has been restricted by some authors (Torrey & Gray 1838; Fernald 1943) to specimens in which the leaflets are "very silky pubescent on both sides". Fassett (1939) and Deam (1940), however, concluded that it is quite impossible to determine where the line between this and the typical form should be drawn and have applied this name to plants with the upper surfaces of the leaflets hairy, while restricting the typical form to those with the upper surfaces glabrous. This application seems to be quite justified, although, as pointed out above, there does not seem to be sufficient segregation of either type to warrant retention of this variety.

Tephrosia leucosericea (Rydb.) Cory supposedly is distinguished by the appressed, silky pubescence of leaflets, calyx and legume and by the ovate-lanceolate, short-acuminate calyx-lobes. According to Rydberg the range is from Kansas to Texas. Although some specimens from this region are strikingly silky with tightly appressed hairs, they differ only in degree of pubescence from plants scattered over much of the southern half of the range of *Tephrosia virginiana*, as far north as New Jersey. Plants with appressed pubescence may occur either alone or with individuals with spreading pubescence. Although the original description indicated that the upper surfaces of the leaflets are glabrous or glabrate, the type-sheet also has portions of a hairy plant. The

calyx-lobes are well within the ordinary range of variation exhibited by *Tephrosia virginiana* and are by no means confined to plants with appressed pubescence, nor are they found in all specimens with such pubescence.

Still another segregate, *Cracca latidens* Small, from Lake County, Florida, combines in one plant short, ovate, abruptly acuminate calyx-lobes with leaves bearing as many as 39 broadly oblong leaflets. Unfortunately, these characters appear to have occurred together only at the type-locality. Although the calyx-lobes of these plants are the shortest of any of the specimens seen, the difference is one of degree only, for such calyx-lobes occur sporadically and are neither limited to Florida nor encountered in many Florida plants. There does seem to be a tendency toward an increase in leaflet-number in northern Florida but this, as well as the shape of the leaflets is quite inconstant.

Cracca Mohrii Rydb. is the other combination of oblong leaflets, acute at either end, with "ovate-lanceolate calyx lobes, 2.5 mm. long." The Type is a fruiting specimen with a single shoot bearing a few out-of-season flowers which are smaller than usual and consequently with shorter calyx-lobes. The plant is little more than a freak and deserves no recognition whatsoever.

Tephrosia virginiana seems, therefore, to be a single, widespread, genetically diverse species, lacking in both distinct morphological and geographical variations, although there appears to be a general tendency toward longer and more spreading, somewhat denser pubescence in the northwestern portion of the range and in the opposite direction in the southeastern part.[1] The segregation of specific or varietal entities on any of the grounds discussed above seemingly can be achieved only artificially.

The typification of the species was fully discussed by Britten and Baker (1900), who concluded that the name *Cracca virginiana* L., based on a mixture of two species, was properly applied to

[1] Evidence has been accumulated showing that the variability in the production of rotenone by individuals of this species is genetically controlled (Little 1942). Although large areas lack rotenone-producing plants, the geographical trend in this physiological characteristic is toward greater production of rotenone in the southern portion of the range. The areas of rotenone production are, however, widely scattered (Florida, Georgia, Louisiana, Texas and Oklahoma). (See data and map in Sievers, Russell, et al. 1938, also brief discussion under Economic Importance in the present paper.)

Tephrosia spicata (Walt.) T. & G., while the plant known for 150 years as *Tephrosia virginiana* (L.) Pers. then took the next oldest name, *T. holosericea* Nutt., the basis of the combination, *Cracca holosericea* (Nutt.) Britten & Bak. Robinson subsequently pointed out (Britten & Baker 1900a), however, that since Walter (1788, p. 188) in describing *Galega spicata* had clearly removed the confusing element, while retaining the Linnaean name for the plant figured by Plukenet, there was no cause for the change in typification. Walter has been followed consistently by everyone, including Britten and Baker who, after Robinson's note, recanted. Under the provisions of Article 52, International Rules of Botanical Nomenclature, ed. 3, Walter's restriction of the name is fully justified. In addition, the specimen in the Linnaean Herbarium (*Galega*, Sheet 4), annotated by Linnaeus, is this species as usually understood. Fassett (1939, p. 59) has also discussed the fixation of the Type, and has concluded that the concept of Torrey and Gray in Flora of North America **1**:296. 1838, which is consistent with the Linnaean specimen, had best be retained. The typical form is the common eastern plant with the upper surfaces of the leaves glabrous.

11. **Tephrosia onobrychoides** Nutt.

Tephrosia onobrychoides Nutt. Jour. Acad. Phila. **7:** 104. 1834. "In the plains of Arkansas." (PH—two authentic specimens: the first marked "T. *onobrychoides Nutt. Arkansas. Dr. Pitcher," and the second marked "T. onobrychoides (Nutt.) Arkansas." Both have spreading pubescence; in the second, the upper surfaces of the leaflets are glabrous. The first specimen may be taken as the Type. NY—a specimen marked in Torrey's hand, "Tephrosia pauciflora Nutt. Gen. 'badly described.' Given to me under this name by Nuttall in 1822, but evidently his T. onobrychoides. Arkansas. Nuttall.")

Cracca onobrychoides (Nutt.) Kuntze, Rev. Gen. **1:** 175. 1891, as *onobrycodes*.

Tephrosia multiflora Featherm. Rep. Bot. Surv. South & Cent. La. 73. 1871 in Ann. Rep. Board Supervisors La. State Univ. 1870, not Blatter & Halb. 1918. "Pine barrens of Ponchatoula," Tangipahoa Parish, Louisiana (GH).

Tephrosia angustifolia Featherm. Op. cit. 73. 1871. "Pine barrens near Ponchatoula," Tangipahoa Parish, Louisiana (GH-watercolor of the presumed Type).

Cracca angustifolia (Featherm.) Pennell, Bull. Torr. Cl. **44:** 337. 1917.

Cracca texana Rydb. N. Amer. Fl. **24:** 176. 1923. "Prairies at Hemp-

stead," Waller County, Texas, *Elihu Hall 119*, 1 June 1872 (NY-Type; F, GH, MO, NY, POM, US).

Tephrosia onobrychoides var. *texana* (Rydb.) Macbr. Field Mus. Publ. Bot. **4:** 193. 1929.

Tephrosia texana (Rydb.) Cory, Rhodora **38:** 406. 1936.

Erect or occasionally decumbent perennial herb from a stout, woody crown and woody tap-root; stems stout, terete, to 6 dm. high (exclusive of inflorescence), sometimes 5 mm. in diameter, branching monopodially or sympodially, the branches ascending or decumbent. Stems, petioles, rachises and petiolules strigillose or hirtellous to strigose or hirsute with cinereous to rusty hairs. Principal leaves 8–22 cm. long, the petioles 7–35 mm. long, exceeded by the lowermost leaflets; stipules linear-lanceolate to linear, acuminate, the lowermost 5–17 mm. long, the upper smaller, persistent, becoming brown; leaflets of the principal leaves (11–)13–25 (rarely –29), linear-oblanceolate or narrowly elliptic to oblong-elliptic or elliptic-cuneate, the apex obtuse, rounded or truncate, emarginate, mucronate, 17–55 (–60) mm. long, 4–16(–20) mm. wide, 2.5–6 times as long as broad, thin, dull, glabrous to strigillose or hirtellous to hirsutulous above, strigillose to short-strigose or hirtellous to hirsutulous (or hirsute along the midrib) with cinereous to somewhat rusty hairs below; petiolules 1–2.5 mm. long. Inflorescences terminal or axillary, usually much exceeding the leaves, 1.4–8 dm. long, stout, leafless, terete below, angled above, with 10 to ca. 40 flowering nodes which may be crowded in 2's or 3's; buds 5–6 at a node, 3–5 of these flowering, 1–3 fruiting. Primary bracts linear-lanceolate to linear-setaceous, the lowermost 5–12 mm. long, those above smaller, often deciduous; secondary bracts smaller, 6 mm. or less long, linear-setaceous, deciduous. Pedicels ascending, 4–10 mm. long, filiform in flower, becoming stout in fruit. Calyx 4–5 mm. long, with a double indument, hirtellous and sparsely to densely hirsutulous or hirsute with cinereous or (on the lobes) rusty hairs, the lobes short, deltoid-acuminate, the upper 1–2.5 mm. long, the lateral 2.5–3 mm. long, the lowermost 3–4 (–5) mm. long. Dried flowers 15–20 mm. long. Corolla white becoming crimson in age, pink or purple upon drying; blade of the banner nearly orbicular to ovate, retuse, 12–18 mm. high, 12–16 mm. broad, the claw 3.5 mm. long; wings ca. 19 mm. long, with a small auricle, the claw 4.5 mm. long; keel shallow, 15–17 mm. long, auricled, the claw ca. 4.5 mm. long. Staminal tube generally 14–15 mm. long, the vexillary stamen free only at the base, contracted at the base, flat on the upper surface. Ovary densely strigillose or hirtellous; ovules 10–11. Legume straight or the proximal half slightly curved downward, 3.5–5.8 cm. long, (3.5–)4.5–5 mm. wide, ascending or spreading, strigillose or hirtellous with cinereous hairs; seeds 3–10, narrowly reniform, oblong or subquadrate in outline, the ends flattened through crowding, 3.4–5 mm. long, 2.5–3 mm. wide, mottled with black, smooth. Somatic chromosomes 22.

Distribution. On well-drained, sandy, non-calcareous open soils of the Coastal Plain (see discussion under Distribution and Ecology) from Mobile County, Alabama to Gonzales and Goliad Counties, Texas, north-

ward to Prairie County, Arkansas, and Muskogee County, Oklahoma, United States. Map 8.

Specimens examined. UNITED STATES. Without definite locality: North America, *Beyrich*, 1834 (MO); Southern States, *Torrey & Gray*, Fl. N. Amer. (GH). Alabama. County uncertain: Portersville, *Mohr*, 1869 (US). Mobile Co.: West Fowl River, *Mohr*, 1867 (DS, MO), 1878, 1897 (NY). Mississippi. Clarke Co.: Enterprise, *Tracy*, 1897 (NY). Arkansas. Without definite locality: *Nuttall* (NY); *Dr. Pitcher* (NY); central and s.w. Arkansas, *Harvey* (KSC). Arkansas Co.: Stuttgart, *Demaree 15414* (KY, NY, TENN). Ashley Co.: Lone Pine Prairie, Mist, 240 ft., *Demaree 18043* (DUKE, GH, KSC, MO, NY, TENN, UC, WVA), *19390* (MO). Bradley Co.: Jersey, *Demaree 19555* (KSC, MO, NY, OKL). Cleveland Co.: Kingsland, *Demaree 19529* (CAS, GH, MO, NY). Drew Co.: *Harvey*, July (GH); Lone Pine Prairie, Ladelle, *Demaree 23369* (GH, MO, NY, TENN, UC); Monticello, *Demaree 17918* (GH, OKL), *23250* (MO, NY, TENN), *17627* (GH, MO, NY, OKL, TENN), *17651* (MO). Garland Co.: Hot Springs, *Scully 384* (GH). Lonoke Co.: Grand Prairie, Carlisle, *Demaree 22339* (MO, PENN). Nevada Co.: Prescott, *Kellogg*, 1910 (MO). Prairie Co.: DeValls Bluff, *Demaree 22177* (GH, MO, NY). Pulaski Co.: Little Rock, *Hasse*, 1885 (NY); Camp Robinson, Little Rock, *Merrill 46* (DUKE). Sebastian Co.: Fort Smith, *Bigelow*, 1853–54 (NY, US); Massard, *Armstrong*, 1940 (TEX). Sevier Co.: *Brinkley 358* (F).

Louisiana. Without data, *Hale* (F, GH, NY); Red River, *Hale* (NY). Acadia Parish: Mermentau, *Degener 5122* (NY). Livingstone Parish: Port Vincent, *Rhoades*, 1931 (GH, KY). Morehouse Parish: Brodnax, *Brodnax*, 1897 (NY). Natchitoches Parish: Chopin, *E. J. Palmer 7637* (DS, MO, PH). Rapides Parish: Alexandria, *Hale* (F); Pineville, *D. & H. Correll 9933* (DUKE, GH, NY); 10 mi. north of Alexandria, *Erlanson 138* (US), 11 mi. north of Alexandria, *143a* (US). St. Tammany Parish: 1.5 mi. north of Abita Springs, *Pennell 4189* (NY, PENN, PH); Covington, *Bro. Arsène 11793* (NY, US), *11509, 11206, 11441* (US); Covington, *Bro. Anect 76, 91* (US); Mandeville to Covington, *Langlois, 1880* (F). Tangipahoa Parish: 6 mi. east and 1 mi. north of Hammond, *Nease*, 28 May, 7 June 1945 (OKL); Ponchatoula, *Featherman* (GH).

Oklahoma. Indian Territory, *Carleton 67* (KSC); *Butler*, 1877 (MO), 1875 (MO); on the False Washita between Fort Cobb ahd Fort Arbuckle, *Palmer 115*, 1868 (NY, US). Atoka Co.: Atoka, *Sheldon 67* (US); Limestone Gap, *Butler 82* (MO), *102* (PH). Bryan Co.: *Blain 299* (US). McCurtain Co.: Broken Bow, *E. J. Palmer 10483* (MO); SE T6S, R25E, SW T6S, R26E, *Little & Olmsted 337* (OKL). Muscogee Co.: Fort Gibson, *Englemann 1009* (MO); Sec 24, T13N, R18E, *Little 1253* (OKL). Pushmahata Co.: 1.75 mi. s.w. of Albion, *Waterfall 634* (GH, NY, OKL); Antlers, *E. J. Palmer 8319* (GH, MO, PH).

Texas. Without definite locality, *Wright* (GH); from Bexar to Austin, *Berlandier 307* (GH); from Guadalupe River to Colorado River, *Berlandier 1567* (GH). Anderson Co.: 19 mi. s.e. of Athens, *C. & A. Lundell 9610*

(SMU). Angelina Co.: Shawnee Prairie, *Boone*, 1934 (TEX). Austin Co.: 3 mi. north of Sealey, *Erlanson 57* (GH, US); 16 mi. west of San Felipe, *Lindheimer 229* (GH, MO, PH); Belleville, *Erlanson 55* (US). Bastrop Co.: Bastrop, *Tharp 1953* (TEX), *2338* (TEX, US), May 1923 (NY), *Duvay* (TEX), *Strandtmann* (TEX); Bastrop-Buescher State Park, *C. & A. Lundell 8987* (SMU); Elgin, *Whitehouse*, 1929 (TEX); McDade, *Tharp 1953* (US). Bowie Co.: *Eggert*, 1898 (NY). Brazoria Co.: Alvin, *Young 7* (TEX, US); 6.5 mi. west of Alvin, *Cory 11386* (GH). Brazos Co.: *Dana 715* (US). Caldwell Co.: *McBryde*, 1931 (TEX). Cass Co.: Atlanta, *McClung*, 1926 (TEX). Cherokee Co.: Chronister, *White*, 1912 (TEX). Colorado Co.: 1 mi. west of Eagle Lake, *Warnock 46300* (TEX); Columbus, *Tharp 2339* (TEX, US). Dallas Co.: Dallas, *Reverchon 245* (MO, US), *246* (F); southeast of Dallas, *Orr 101* (SMU). Fayette Co.: *Wurzlow*, 1891 (F); Colony, *Crawford 4* (MO), *37, 43* (US), *47, 60* (F). Galveston Co.: Kemah, *Fisher*, 1915 (TEX), 1921 (US); San Leon, *Fisher*, 1915 (UC, US). Goliad Co.: Goliad, *C. Williams 19* (PH). Gonzales Co.: *McBryde*, 1931 (TEX). Gregg Co.: *York*, 1939 (GH, TEX), 1941 (GH, SMU, TEX). Hardin Co.: 7 mi. north of Silsbee, *Cory*, 1936 (GH). Harris Co.: Houston, *Lindheimer 32* (GH, MO, UC); Hockley, *Thurrow*, 1890 (F); Houston, *Eifrig*, 13 & 17 July 1926 (F); Houston, *Fisher*, 1918 (CAS, US), 1936 (CAS); Grapeland, *Tharp 81* (NY, US). Jackson Co.: near LaWard, *Drushel*, 1933 (NY). Jefferson Co.: Beaumont, *Hooks*, 1936 (TEX); Port Arthur–Beaumont, *Kilthoff*, 1927 (US). Lee Co.: *Knobloch*, 1931 (TEX). Leon Co.: 10 mi. n.e. of Marques, *Innes & Moon 942* (GH, TEX). Matagorda Co.: Citrusgrove, *F. Johnson*, 1930–1931 (TEX). Montgomery Co.: Willis, *Warm*, 25 May (MO). Nacogdoches Co.: Fern Lake, *Parks RX2326* (MO). Orange Co.: Vidor, *M. Wood*, 1931 (TEX). Polk Co.: Corrigan, *W. Taylor*, 1941 (TEX). Smith Co.: Lindale, *Reverchon 245* (MO). Tarrant Co.: Van Zandt, *Raborn & Reynolds* (TEX). Upshur Co.: 14 mi. west of Gladewater on Highway 90, *Whitehouse 16492* (SMU). Van Zandt Co.: Grand Saline, *Raborn & Reynolds*, 4 June (TEX). Walker Co.: Huntsville, *Tharp*, 1919 (TEX, US). Waller Co.: Hempstead, *Hall 119* (F, GH, MO, NY, POM, US). Victoria Co.: Victoria, *Tharp*, 1923 (TEX, US). Washington Co.: Brenham, *Whitehouse*, 1931 (TEX); *Brackett*, 1938 (TEX). Wood Co.: Golden, *McMullen*, 1927 (TEX); north of Crow, *C. & A. Lundell 9480* (SMU).

Both Pennell and Rydberg employed stature of plant, degree of pubescence and number of leaflets in maintaining *Tephrosia angustifolia* Featherman as a distinct entity. These characters are, however, quite inconstant and there is neither morphological nor geographical isolation. It is likely that the relatively few specimens then available indicated a discontinuity where none exists. The number of specimens available from Louisiana, Mississippi and Alabama is still not large or nearly adequate,

but it is sufficient to show that there is no justification for retaining *Tephrosia angustifolia* as a taxonomic entity of any sort. *Tephrosia multiflora* Featherman, described at the same time from the same locality as *T. angustifolia*, appears to have been merely a slightly larger plant.

The only significant criterion employed by Rydberg in separating his *Cracca texana* from the typical *Cracca* (*Tephrosia*) *onobrychoides* was pubescence, the leaves of the former plant being described as "glabrous or nearly so above, grayish strigose beneath," while those of the latter were "silky pilose both sides or glabrate above." The situation is not quite so simple, for the upper surface of the leaflets of *Tephrosia onobrychoides* (as defined in the present paper) may be glabrous or moderately to densely strigillose, short-strigose or hirsutulous, while the lower surface varies from sparsely strigillose or short-strigose to densely hirsutulous with spreading hairs. If degree of pubescence (including density of distribution and length of hairs) be eliminated as divisible only into arbitrary categories (as seems to be the case both here and elsewhere in the genus), the essential elements are (1) upper surfaces of leaflets glabrous versus hairy and (2) lower surfaces appressed-hairy versus spreading-hairy. These characters are usually well defined with a sharp break between the type with glabrous upper surfaces and that with trichomes evenly distributed over the surface of the leaflets. In plants in which the upper surfaces of the leaflets are hairy, the trichomes are spreading or appressed, corresponding to those on the lower surfaces. As might also be expected, plants with appressed hairs on the leaves have appressed hairs on stems and pods, while those with spreading pubescence have similar pubescence on the stems and bear minute, spreading hairs on the pods.

These two sets of leaf-pubescence characters occur in all four possible combinations within *Tephrosia onobrychoides*. Two or more types are often represented in the same collection and four are represented in *Demaree 18043*, Ashley Co., Arkansas. As is indicated in Map 8, the assembled herbarium-material clearly shows the lack of geographical segregation of any possible combination of pubescence-characters. This is further borne out by the few mass-collections which it has been possible to make. As is shown in the accompanying table and in Map 8, these show

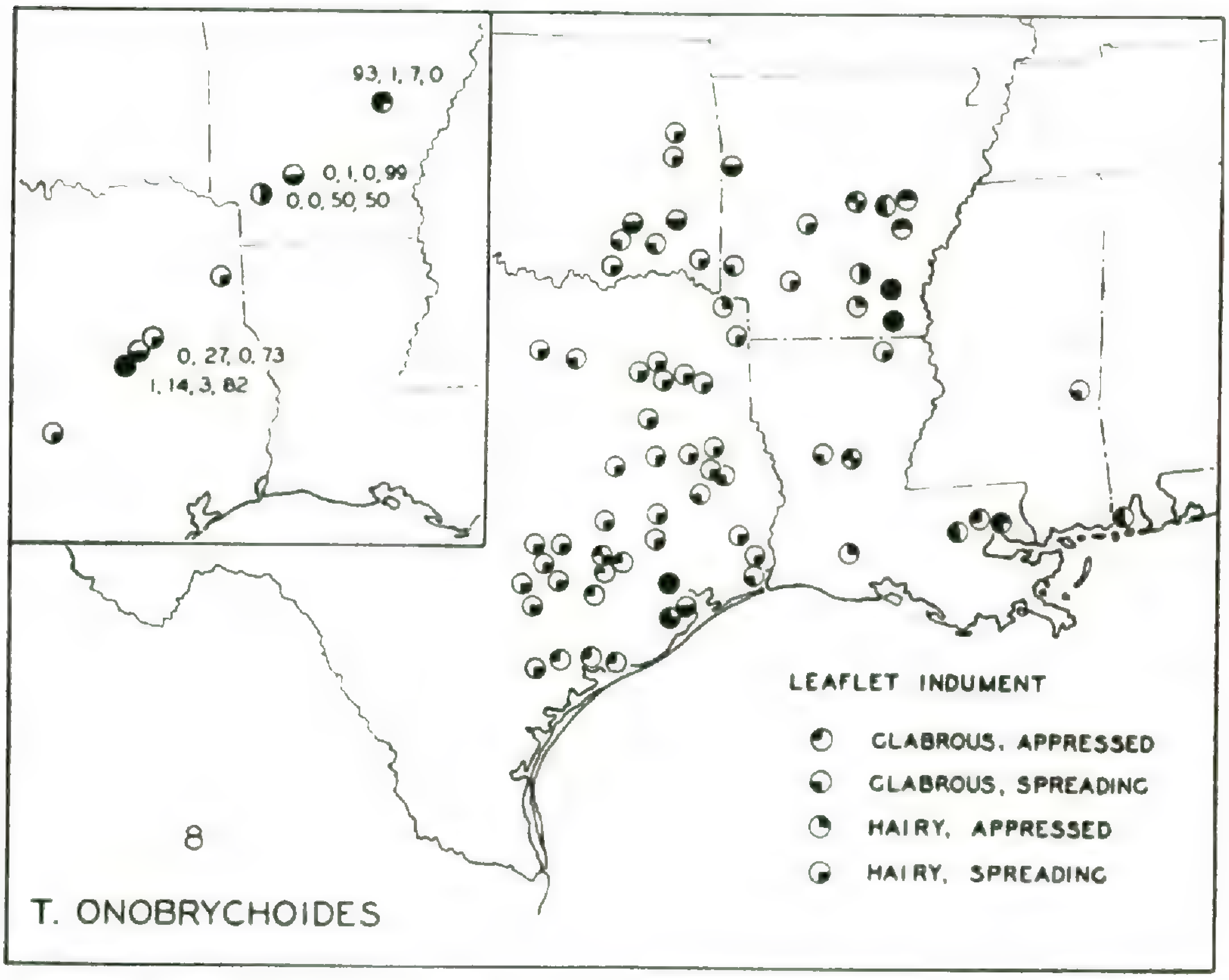
more or less random distribution of these factors from one colony to another, although it is likely that the amount of variability differs from one part of the range to another. Even without the desirable genetic experiments and additional field-work it seems clear that the various pubescence-types merely represent forms unworthy of nomenclatural designation.[1]

Mass-collections of *Tephrosia onobrychoides* to show variation in pubescence. Collections are arranged in sequence from northeast to southwest. (See inset, Map 8.) Figures in parentheses are per cent of total.

Locality	Leaflets glabrous above; appressed beneath	Leaflets glabrous above; spreading beneath	Leaflets pubescent above; hairs appressed	Leaflets pubescent above; hairs spreading	Total
Hazen, Prairie Co., Ark.	102 (92.7)	1 (0.9)	7 (6.3)	——	110
Gurdon, Clark Co., Ark.	——	1 (0.8)	——	127 (99.2)	128
Hope-Sheppard, Hempstead Co., Ark.	——	——	62 (49.6)	63 (50.4)	125
Jefferson, Harrison Co., Tex.	——	——	——	87 (100)	87
Neches, Anderson Co., Tex.	——	——	——	28 (100)	28
Palestine-Oakwood, Anderson Co., Tex.	——	27 (26.7)	——	74 (73.3)	101
Oakwood, Leon Co., Tex.	1 (1)	14 (14)	3 (3)	82 (82)	100
Rockdale, Milam Co., Tex.	——	——	——	43 (100)	43

[1] It should be noted that Map 8 shows only the distribution of the four types of pubescence as represented in herbarium-material and does not necessarily indicate population variability from one area to another. The number of specimens represented by each dot on the map varies from one to about seventeen (as from Drew Co., Ark.), the exact number depending at least in part upon the habits of the individual collectors, some of whom include portions of several plants in a single number while others tear one plant limb from limb and make several specimens of the fragments. Since many plants of *Tephrosia onobrychoides* are too large to fit an herbarium-sheet it is impossible to tell exactly how many individuals are represented. Other factors involved include the paucity of the sample, the question of the randomness of the sample represented by the herbarium-specimens and the relative scarcity of collections from Louisiana, Mississippi and Alabama. As a result of some of these factors, the lack of variability shown along the western part of the range of *Tephrosia onobrychoides* in Texas may well be more apparent than real. Although the populations in this area appear from the herbarium-data to include only plants with both surfaces of the leaflets covered with spreading hairs, the few mass-collections show that there is, in reality, much more variation present and that this may fluctuate greatly between colonies of the same region. It is, however, desirable that abundant mass-collections be made before conclusions be drawn as to the variability of populations in various parts of the range of the species.

A peculiar plant intermediate between *Tephrosia onobrychoides* and *T. florida* is represented by *Seymour & Earle 44*, Ocean Springs, Mississippi, 1 Sept. 1891 (CAS, DUKE, GH, MO). The stems of these specimens apparently were decumbent with peti-



Map 8. Distribution of Tephrosia onobrychoides. Localities or collections from which two or more pubescence-types are known by herbarium-specimens are indicated by superposition of two or more symbols. A solid dot, for example, indicates the occurrence of all four types at the same locality or in the same collection. For discussion see accompanying text. Inset map indicates mass-collections. Figures accompanying symbols represent the percentage of each of the four pubescence-types in the same order as in the legend.

oles longer than the lowermost leaflets; the leaves are mostly 19-foliolate; the axis of the inflorescence is somewhat flattened; the flowering nodes vary from 6 to 13; and the vexillary stamen is connate with the tube, but has a moderately distinct thickening on the upper side near the base.

12. **Tephrosia rhodantha** Brandeg.

Tephrosia rhodantha Brandeg. Zoë **5:** 201. 1904. Cofradia (east of Culiacán), Sinaloa, Mexico, *T. S. Brandegee*, 21 Oct. 1940 (UC-Type; GH, US).

Cracca rhodantha (Brandeg.) Rose, Contr. U. S. Nat. Herb. **12:** 270. 1909.

Erect herbaceous or suffrutescent, occasionally decumbent perennial up to 1 m. tall, from a woody crown and tap-root. Stems, petioles and rachises sparsely to densely hirtellous or hirsutulous or occasionally hirsute with cinereous or rusty hairs sometimes more than 1.5 mm. long, the peduncles of the inflorescences with appressed to spreading hairs. Principal leaves 4.5–13 cm. long, spreading or ascending, the petiole 2–8(–12) mm. long, shorter than the lowermost leaflets, the rachis 3–10 cm. long; stipules linear-lanceolate to linear-subulate, 6–10 mm. long, 1.5 mm. or less wide; leaflets of the principal leaves 11–21, narrowly elliptic to linear-oblong or elliptic, the base cuneate to obtuse, the apex rounded to retuse, mucronate, (10–)15–43 mm. long, (3–)4–10(–14) mm. wide, (3–)4–6 times as long as broad, the lowermost leaflets smallest; leaflets dull, often appearing velvety, sparsely to densely hirtellous with fine hairs above, sparsely to densely hirtellous, hirsutulous, strigillose or strigose with cinereous or rusty hairs beneath; petiolules about 1 mm. long. Inflorescences terminal and axillary, the latter inserted singly and emerging obliquely from the axil, leafless, slender, lax, ascending, 4–45 cm. long, the peduncle 3–19 cm. long; flowering nodes 3–25, rather evenly scattered, the flower-buds ca. 3–5 at a node, 1–4 flowering, 1–3 fruiting. Pedicels 3–7(–9) mm. long, slender, ascending, almost filiform in flower, thickening somewhat in fruit. Dried flowers 12–15 mm. long. Calyx 3.5–6 mm. long, hirtellous and hirsutulous to hirsute with gray or rusty hairs, the lobes subulate-attenuate, the upper 1–3 mm. long, the lateral 2–4 mm. long, the lowermost 2.5–4.5 mm. long. Corolla white with a green spot at the base of the banner, becoming pink and then carmine in age, purple in dried specimens; blade of the banner suborbicular, 11–13 mm. high and broad, finely silky-hairy without, the claw 2.5 mm. long; wings obliquely obovate, 13–15 mm. long, 4–5.5 mm. broad, the claw 2–2.5 mm. long; keel 13–15 mm. long, the claw 2.5–3 mm. long. Staminal tube 11–12 mm. long; vexillary stamen free with a prominent, angular callosity on the upper side near the base. Ovary densely silky-hirtellous; ovules ca. 15. Legume straight to slightly curved upward, tapering into the persistent style-base on the upper side, 4.5–7 cm. long, 3.5–4.5 mm. wide, thinly but evenly hirtellous with antrorsely-directed, cinereous or rusty hairs, 0.2–0.4 mm. long; seeds (8–)12–15, oval-reniform in outline, 2.8–3.4 mm. long, 2–2.5 mm. broad, brown to gray, variegated with black. Somatic chromosomes 22. Flowering collections from August to February.

Distribution. Open rocky ground and pine forests, mostly at low altitudes (0–600–1340 m.), from Sinaloa to Colima, México, Guerrero and Tabasco, in Mexico, and to British Honduras and Guatemala. Map 5.

Specimens examined. MEXICO. Sinaloa: Cofradia, *Brandegee*, 1904 (GH, UC, US); Lodiego, *Palmer 1619*, 1891 (GH, NY, US); Capule, 200 m., *Ortega 6089* (US); rocky arroyo margin, 1000 ft., Quebrada de Ilama, Sierra Tacuichamona, *Gentry 5706* (MO) (for exact locality, see Gentry 1946a). Colima: Alzada, *Orcutt 4677* (DS, F). México:

Tejupilco, Dist. Temascaltepec. 1340 m., *Hinton 1921* (K). Guerrero: Hill, Arcelia-Fraguas, Coyuca, Dist. Mina, *Hinton 6603* (F, GH, K, NY, US); oak forest, Alcaparosa, 560 m., Dist. Galeana, *Hinton 10845* (GH, K); hill, Vallecitos, Dist. Montes de Oca, *Hinton 11403, 11641* (GH); roadside bank on granitic soil above Río Papagayo, km. 376–377 below Tierra Colorada on road to Acapulco, *Moore & Wood 4703* (GH, UC). Tabasco: Estapilla, Tenosique, *Matuda 3517* (GH).

BRITISH HONDURAS. Monkey River, in open pine ridge, *Gentle 3632* (A, MO, NY); small shrub growing in open pine flats, All Pines, alt. 5 ft., *Schipp 685* (A, GH, MO, NY, UC).

GUATEMALA. Izabal: Hilly pine forest near Quiriguá, 72–150 m., *Standley 72269* (F); pine ridge, vicinity of Quiriguá, *Standley 23938* (F).

Tephrosia rhodantha is a clearly marked species but it has been confused both with *Tephrosia multifolia* and **T. littoralis* (= **T. cinerea*). The combination of inflorescences inserted singly in the axils of leaves and emerging obliquely, free vexillary stamen and barbate style are quite distinctive, however. Further important points of divergence are in the slender, hirtellous pod which commonly contains 13 to 15 seeds, in contrast to the above species with 8–10 and 8 or 9–12, respectively, and in the leaflet-number which is 11–21 in *T. rhodantha* and 15–37 (predominantly 21–35) and 5–19 in the other two.

The relationships of *Tephrosia rhodantha*, in spite of its habit and axillary inflorescences, appear to be with the sympodially branched, white-flowered species with a free vexillary stamen. As in those species, the flowers of *T. rhodantha* are white, but become pink and then carmine in age. In fresh flowers (and in most herbarium-material) the vexillary stamen is quite free from the tube, but in an occasional pressed flower it is sometimes difficult to determine this condition with certainty. For this reason the species appears at several places in the artificial key.

13. **Tephrosia cana** Brandeg.

Tephrosia cana Brandeg. Proc. Calif. Acad. II. **3:** 126. 1891. "High Sierras—Sierra de la Laguna and Sierra de San Francisquito," Baja California, Mexico. Rydberg chose Sierra de la Laguna as the type-locality, although no specimens from there are in the Brandegee collections at UC. The Type is better taken as "Sierra de San Francisquito," *T. S. Brandegee*, 20 Oct. 1890 (UC-Type; GH).

Cracca cana (Brandeg.) Rydb. N. Amer. Fl. **24:** 176. 1923.

Cracca californica Rydb. N. Amer. Fl. **24:** 176. 1923. Mesa Verde, Cape District, Baja California, *T. S. Brandegee*, 1889 (NY-Type).

Erect or decumbent herbaceous perennial from a woody crown; roots unknown; stems 6–9 dm. long, often branching sympodially, terete or somewhat sulcate, often purplish. Stems, petioles, rachises, petiolules and axes of inflorescences sparsely to densely strigillose to short-strigose or hirsutulous and pilose with fine white hairs. Leaves 5.5–17.5 cm. long, ascending or spreading, the petioles (3–)8–58 mm. long, longer or shorter than the lowermost leaflet; stipules linear-lanceolate to linear-subulate or narrowly deltoid, 7–12 mm. long, often brown and persistent, reflexed, somewhat rigid; leaflets 7–23, linear-elliptic, oblong-elliptic or elliptic, the apex acute, obtuse or sometimes retuse with a straight or sometimes recurved mucro, 11–34(–40) mm. long, (3–)4–9(–12) mm. wide, veiny, glabrous to densely hirsutulous with ascending white hairs above, moderately to densely hirsutulous with antrorsely directed or nearly erect white hairs below, the leaflets often appearing silky or velvety white; petiolules 1–2.5 mm. long. Inflorescences opposite the leaves or terminal, leafless, usually long-peduncled, erect or ascending, 7–40 cm. long, exceeding the leaves, the flowering nodes 6–19, often congested; buds 4–5 at a node, apparently crowded because of the presence of bracteoles, 1 or 2 fruiting. Primary bracts linear-lanceolate to lanceolate, 7–9 mm. long, often deciduous or broken off; secondary bracts linear-lanceolate to lanceolate, 5 mm. or less long. Bracteoles 2, lanceolate to ovate-lanceolate, acuminate, 5–6 mm. long, borne just below the calyx or on the pedicels or near the base of the pedicels. Pedicels 5–8 mm. long, spreading-hirtellous. Dried flowers 11–15 mm. long. Calyx 6–7.5 mm. long, with the bracteoles and bracts densely hirsutulous with fine, white hairs; calyx-lobes lanceolate to ovate, long- or short-acuminate, the upper 3–4.5 mm. long, the lateral 4–6 mm. long, the lowermost 4–6 mm. long. Corolla apparently white or yellowish, becoming pink, rose or lavender in age; blade of the banner suborbicular to broadly ovate, 14–15 mm. high, 13–16 mm. broad, the claw 2.5–3 mm. long; wings 13–17 mm. long, the claw 3–3.5 mm. long; keel nearly semicircular, 12–17 mm. long, slightly auricled, the claw 3–4 mm. long. Vexillary stamen completely free, with a prominent 2-lobed callosity on the upper side near the base. Legume with the outer half slightly curved upward, 4–7 cm. long, 4–5 mm. broad, hirtellous with ascending or erect hairs; seeds 6–11, oblong to subreniform in outline, 3.8–4.4 mm. long, 2.2–2.8 mm. broad, buff, mottled with olive green and/or black. Somatic chromosomes 22.

Distribution. Rocky, open ground and oak forests, 0–1900 m., Cape Region, Distrito del Sur, Baja California, Mexico. Map 15.

Specimens examined. MEXICO. Baja california: Dist. del Sur: Trail down the Lagunas, west side, *M. E. Jones 27203*, 24 Sept. 1930 (POM); in oak forest on dry, rocky hills north of the meadow on Sierra de la Laguna, 5000 ft., *Hammerly 389*, 14 Oct. 1941 (CAS, DS); grassy opening at edge of pine and oak forest, 1850 m., along trail to El Picacho de la Laguna, east of Todos Santos, *Carter, Alexander & Kellogg 2406*, 26 Dec. 1947 (GH, UC); Cañon San Bernardo, *Brandegee*, 13 Oct. 1893; with *Ficus, Lysiloma, Karwinskya* on crest of narrow decomposed granite ridge,

Arroyo San Bernardo, a few miles east of Rancho San Bernardo, eastern drainage of Sierra de la Victoria, west of Miraflores, 750 m., *Carter 2696*, 9 Apr. 1949 (UC); Saucito, *Brandegee*, 14 Oct. 1893 (GH, NY, POM, UC); Sierra de San Francisquito, *Brandegee 135*, 20 Oct. 1890 (UC, US–30 Oct. 1890) (GH–20 Oct. 1891, prob. this number: part of one specimen appears to be the lower portion of the Type-UC); San José del Cabo, *Brandegee*, 17 Sept. 1890 (UC); in white granite sand with *Cyrtocarpa edulis*, *Bursera microphylla*, *Jatropha* and *Fouquieria* on plateau 9.5 km. north of Santiago, ca. 300 m., *Carter 2711*, 10 Apr. 1949 (UC); granite rocks in canyon, San Bartolo, *Gentry 4366*, 20 Mar. 1939 (DS, MO, UC); rocky hillsides near beach, 11 mi. south of Todos Santos, *Whitehead 882*, 25 Mar. 1935 (DS); 17 mi. south of Todos Santos, *Shreve 7230*, 25 Mar. 1935 (DS, F, GH); Los Barriles, *Gander 9770*, 3 Nov. 1941 (CAS).

Tephrosia cana is distinguished by its 7–23 leaflets, congested inflorescences, rather broad calyx-lobes, densely white calyces and bracts, bracteoles on calyces or pedicels, free vexillary stamen and hirsutulous legumes. Until the spring of 1949 the species appeared to be composed of two groups of specimens, the one of collections made from September through December, the other of three collections made in March, all from the Cape Region of Baja California. The March collections are exceedingly white-hairy, have shorter petioles, slightly fewer leaflets, somewhat larger flowers, slightly broader and more shortly acuminate calyx-lobes and narrower and shorter bracteoles than does typical *Tephrosia cana*, described from an October collection. This apparent seasonal segregation suggested that these very hairy plants might represent either a seasonal phase or another entity. In April, 1949, however, Miss Annetta Carter of the University of California very kindly made several excellent collections of *Tephrosia* during a trip to Baja California. Her material dispels any possibility of seasonal phases, for *Carter 2711* shows within a single colony various combinations of characters which definitely link the two groups and *Carter 2696* is the typical form of the species. It is interesting to note that *Carter 2711* was collected at 300 m., while the very white-hairy "March" specimens are from sea-level and most of the remaining specimens (representing the typical form) are apparently from higher altitudes, up to 1850 m., suggesting altitudinal variation. *Brandegee*, 1890, from San José del Cabo, and possibly collected at a low altitude, is, however, the typical form.

The status of the plant described by Rydberg as *Cracca californica* is much more uncertain. I have seen only 3 collections, each representing a single plant and all from the Cape Region of Baja California:

Mesa Verde, *Brandegee*, 1899 (NY-Type); granitic soil, wash margin, forested hills, San Antonio, *Gentry 4335*, 18 Mar. 1939 (DS); on rocky roadside bank with *Tecoma stans* and *Jatropha*, rolling hills, 5.3 km. n.w. of San Antonio, 300 m., *Carter 2714*, 11 Apr. 1949 (UC).

These three plants are similar to *Tephrosia cana* in habit, leaflet-number and -shape, stipules, vexillary stamen, etc. They differ strikingly, however, in the calyx, which bears only very narrow, linear bracteoles 2 mm. long (type-specimen) or lacks them completely. The calyx-lobes of the first two specimens are narrower than in *T. cana*, while on *Carter 2714* the entire calyx is very similar in shape to that of *T. Palmeri* with no evidence of bracteoles. These plants also differ from *T. cana* in their much less congested inflorescences with fewer buds at a node. *Carter 2714* definitely seems to combine characters of both *T. cana* and *T. Palmeri* and suggests that the possibility of a hybrid origin of these plants should be considered. Miss Carter reports that she found only the one large plant, however, and did not see either *T. cana* or *T. Palmeri* at that locality. Both occur in the Cape region, nevertheless, and future collectors in that area may well watch for additional plants of this type. Pending further evidence these specimens are provisionally placed here with *T. cana.*

It may be of interest to call attention to Brandegee's original description of *Tephrosia cana* in which he noted the diadelphous androecium with the "vexillary stamen free for its whole length, even in the bud." He appears to have been the only American author to notice this conspicuous character which sets off a group of 10 related, white-flowered species.

14. **Tephrosia Palmeri** S. Wats.

Tephrosia Palmeri S. Wats. Proc. Amer. Acad. **24:** 46. 1889. "Side of arroyo in the mountains," near Guaymas, Sonora, Mexico, *E. Palmer 246*, Oct. 1887 (GH-Type; DS, NY, US).

Tephrosia Purisimae Brandeg. Proc. Cal. Acad. II. **2:** 149. 1889. San Gregorio, La Purísima and Cardón Grande, Baja California, Mexico. Material from La Purísima and Cardón Grande not seen; only the specimen from San Gregorio is among Brandegee's collections at UC. In the

absence of other material this should be the Type: *T. S. Brandegee*, 3 Feb. 1889 (UC-Type; GH, PH, US).

Cracca Palmeri (S. Wats.) Rose, Contr. U. S. Nat. Herb. **12:** 270. 1909.

Tephrosia hamata Brandeg; Rydb. N. Amer. Fl. **24:** 177. 1923, in syn. MS. name only, not published by Brandegee.

Cracca hamata Rydb. N. Amer. Fl. **24:** 177. 1923. San José del Cabo, Baja California, Mexico, *T. S. Brandegee*, 1 Oct. 1890 (NY-Type; DS, UC; US-fragment).

Suffrutescent caespitose perennial sometimes 7 dm. high, from a woody crown; stems many, annual, freely branching, partially sympodial, erect or decumbent, flexuous, up to 1 m. long, terete or obtusely angled. Entire plant moderately to densely strigillose or short-strigose with fine white hairs, appearing silky, canescent or hoary, frequently bluish-green. Leaves 2.6–18 cm. long, ascending, the petioles 7–40 mm. long, shorter or longer than the lowermost leaflets, the rachis 1.7–13 cm. long; stipules triangular-lanceolate or subulate, 5 mm. or less long, persistent, brown, rigid or spinescent, usually ascending; leaflets of the principal leaves 5–13 (most often 9), linear, linear-oblong or linear-oblanceolate, the base obtuse or acute, the apex acute, obtuse or retuse, with a straight or recurved mucro; leaflets 9–45 mm. long, (1.7)2–7 mm. wide or the terminal leaflet sometimes 50–75 mm. long, 4–6 mm. wide, moderately to densely strigillose to short-strigose on both surfaces with white hairs, usually appearing hoary or canescent, often bluish green, often somewhat conduplicate along the midrib and upwardly reflexed, the veins pale or brownish beneath; petiolules small, 1–2 mm. long. Inflorescences sometimes opposite the leaves or merely terminal, ascending or erect, 7–45 cm. long, usually greatly exceeding the leaves and leafless; flowering nodes (4–)6–16, the buds 4–5 at a node, 3–4 of these developing, 1–2 fruiting. Primary bracts subulate, rigid, persistent (although often broken in herbarium specimens), 4–5 mm. or less long; secondary bracts linear-setaceous, 4 mm. or less long. Pedicels 4–8(–10) mm. long, ascending. Dried flowers 14–18 mm. long. Calyx 5–7 mm. long, the lobes triangular, acuminate to subulate, the sinuses between usually U-shaped, the upper lobes 2.5–3.5 mm. long, the lateral 3–4 mm. long, the lowermost 3.5–4.5 mm. long. Corolla apparently white or pale yellow, becoming pink or lavender in age; blade of the banner broadly oval or ovate to suborbicular, 12–15 mm. high, ca. 14 mm. wide, finely hairy on the back, the claw 2–2.5 mm. long; wings oblong, 14–18 mm. long, with a basal auricle, the claw 3–4 mm. long; keel 13–17 mm. long, with or without a small basal auricle, the claw 3–4.5 mm. long. Staminal tube 10–14 mm. long, the vexillary stamen completely free, thickened above the base with a rounded or slightly 2-lobed callosity. Ovary densely white-silky, strigillose. Legume nearly straight, cylindrical, beaked by the upcurved style-base, 6.5–7 cm. long, 3–4 mm. in diameter, horizontal or ascending, amber-brown, densely strigillose to short-strigose with white hairs usually less than 0.8 mm. long, or occasionally hirtellous or hirsutulous with ascending hairs; seeds 6–12, oblong, 4.5–5 mm. long, 1.8–2.2 mm. wide, pale brown, mottled with black. Somatic

chromosomes 22. Flowering collections from late September and October and January to mid-May.

DISTRIBUTION. Mountains near Guaymas, Sonora, and sandy and gravelly washes in Baja California, Mexico, from about latitude 28° southward. Map 15.

SPECIMENS EXAMINED. MEXICO. SONORA: Side of arroyo, mountains, Guaymas, *Palmer 246*, 1887 (DS, GH, NY, US). BAJA CALIFORNIA: Arroyos, Santa Gertrudis, 600–700 ft., *Purpus 103* (DS, US); canyon 10 mi. north of Santa Rosalía on the Gulf Coast, *Reed G629* (DS); in wash 9 mi. from Santa Rosalía on the San Ignacio road, *Ferris 8631* (DS, NY, US); broad gravel wash just north of flying field, Santa Rosalía, *Ferris 8710* (DS, NY, US); Santa Rosalía, *Palmer 198*, 1890 (CAS, GH, US); Carmen Island, *Palmer 847*, 1890 (US); sandy washes, San Nicholas Bay, *I. M. Johnston 3709* (CAS, GH, US); San Gregorio, *Brandegee*, 3 Feb. 1889 (GH, PH, UC, US), 1 Feb. 1889 (GH), 6 Apr. 1889 (UC); San Josef, *Rose 16567* (NY, US); Concepción Bay, *Berry 97* (CAS); among rocks around alkali flat at Coyote Cove, Concepción Bay, *Hammerly 122* (CAS, DS, GH); sandy arroyo margin among crags, Purísima, *Gentry 4221* (DS, GH, MO); mountain east of Loreto, *M. E. Jones 27195* (POM); rocks at cliff base, foothills, Rancho Primera Agua, Sierra de la Giganta, *Gentry 3718* (GH, MO, US); La Paz, *M. E. Jones 24274* (CAS, DS, MO, POM, UC); granitic bluffs near Gulf, north of Las Cruces, 32 km. east of La Paz, *Carter 2570* (UC); San José del Cabo, *Rose 16430* (NY, US), *Purpus 494* (MO, US), *Brandegee*, 1 Oct. 1890 (DS, NY, UC, US), 29 Sept. 1890 (GH), 29 Sept. 1891 (PH); along gravelly wash banks, 15 mi. south of Rancho San Bruno, *Whitehead*, 1935 (DS); gravelly hillside 11 mi. north of Cabo San Lucas, *Whitehead 909* (DS); 5 mi. east of Cabo San Lucas, sea level, *Shreve 5265* (DS, UC); Cabo San Lucas, *Johansen 534* (DS), *Gander 9696* (CAS).

According to Rydberg, the plant he described as *Cracca hamata* differs from *Tephrosia Palmeri* in its linear-oblanceolate leaves with a recurved mucro. There are, however, so many intermediate leaf-shapes and conditions of the mucro that there can be hardly any doubt but that these are only two phases of the same species. In leaflet-number, calyx, fruit and pubescence the two are identical. *Tephrosia Purisimae* Brandegee, another segregate, was separated on the basis of a supposedly different habit, pink flowers and smaller seeds. The cotypes are, however, identical with *Tephrosia Palmeri*. The specimen of the type-collection of *T. Palmeri* (*Palmer 246*, 1887) in UC, with which Brandegee presumably compared his plants is not that species at all, but a fruiting specimen of **T. tenella* A. Gray, a species with glabrous styles. Isotypes in GH and DS are mixtures of *T. Palmeri* and **T. tenella*. The white or ochroleucous flowers of

T. Palmeri normally become pink or lavender in age, as do those of many species, so that this supposed difference is of no consequence. In *T. Palmeri*, as here understood, the leaflet-number, the silvery-white, tightly appressed pubescence, the rigid stipules and the deltoid calyx-lobes are characteristic.

15. **Tephrosia Rugelii** Shuttlew. ex Robinson

Tephrosia Rugelii Shuttlew. ex Robinson, Bot. Gaz. **28:** 197. 1899. "*In pinetis, ad fl. Manate, Florida austr. occ.*" (Manatee River, Manatee County, Florida, United States), *Rugel 156*, June 1845 (GH-Type; NY).

Cracca Rugelii (Shuttlew. ex Robinson) Heller, Cat. N. Amer. Pl. ed. 2. 7. 1900.

Erect or decumbent perennial herb from a woody crown and fusiform tap-root up to 6 dm. long and 2.2 cm. wide, often with 1–several fusiform or nearly cylindrical branch-roots from its upper part; stems 1–many, up to 5.5 dm. long, monopodial with numerous axillary branches, some of which may overtop the main axis late in the season, giving the appearance of sympodial branching. Stems, petioles, rachises and petiolules strigillose or hirtellous to short-strigose or hirsutulous with golden or rusty hairs. Leaves 3.5–10 cm. long, nearly sessile or with petioles 0.2–2 cm. long; stipules oblanceolate to linear, acuminate, 8 mm. or less long, persistent, or those of the inflorescence deciduous; leaflets (3–)9–15(–17), obovate to elliptic-cuneate to narrowly cuneate, the apex obtuse, retuse or, on the terminal leaflet, sometimes obcordate, mucronate, the leaflets of a single leaf rather uniform in shape and size or the terminal slightly larger, 10–20 (–22) mm. long (including the petiolule), (3–)4–10(–14) mm. wide, yellowish green, strigillose or hirtellous above with fine cinereous hairs or rarely glabrous, strigillose or hirtellous to short-strigose or hirsutulous below with cinereous hairs, the margins with golden or rusty hairs; petiolules 1–1.5 mm. long. Inflorescences terminal or axillary, up to 15 cm. long with 1–6(–8) flowering nodes, the flowers 2–3 at a node, the lowermost and often one or more additional nodes with leaves; leaves of the inflorescence often reduced upwards, eventually to a single leaflet, a linear bract with parallel stipules, a 3-toothed bract or to a lanceolate or linear, acuminate primary bract 5–8 mm. long. Pedicels 4–12 mm. long, ascending. Dried flowers 12–18 mm. long, fresh flowers to 20 mm. Calyx 5–6 mm. long, strigillose and short-strigose or hirtellous and hirsutulous with rusty hairs, the lobes ovate-lanceolate to lanceolate, acuminate, the upper 2–3 mm. long, the lateral (2.5–)3–5 mm. long, the lowermost 3–6 mm. long, about 1.5 mm. wide. Corolla white (the back of the banner yellowish, faintly veined with red), becoming pink and then carmine with age and purple upon drying; blade of the banner nearly orbicular to subquadrate, 12–16 mm. high, 12–19 mm. broad, silky on the back, the claw 2.5–3 mm. long; wings obovate, 15–18 mm. long, auricled, the claw 2–3 mm. long; keel 12–14 mm. long, 6–7.5 mm. deep, the claw 2.5–3 mm. long. Staminal tube 8–11 mm. long, the vexillary stamen free, distinctly knobbed on the

upper side near the base. Ovary densely strigillose, silky; ovules 10–12. Legume slightly downwardly falcate or straight, 2.5–4 cm. long, 4.5–5.5 mm. wide, horizontal or ascending, hirsutulous or hirtellous with rusty, antrorsely-directed hairs; seeds 10–12, globose to subquadrate in outline and flattened laterally, 2.2–2.6 mm. in diameter, brown to gray, variegated with black. Somatic chromosomes 22. Flowering collections principally from mid-March through early June and sporadically through October.

Distribution. Well-drained or dry, open, sandy soil in pinelands, flatwoods, pine and oak barrens, peninsular Florida from St. John, Putnam and Alachua Counties south to Broward and Lee Counties. Map 10.

Specimens examined. UNITED STATES. Florida: Without definite locality: *Simpson 6672* (GH, US); East Florida, *Reynolds* (US); South Florida, west coast, *Rothrock*, 1887 (PENN); Kipimee Prairie, *Mearnes*, 1901 (US). Alachua Co.: east of Gainesville, *Murrill*, Mar. 1939 (FLAS), Apr. 1939 (DUKE). Brevard Co.?: Okeechobee region, *Fredholm 5933* (GH, NY, US) (probably an error for Broward Co., since Brevard is far from Okeechobee). Broward Co.: Ft. Lauderdale, *Meredith*, 1917 (PH). Charlotte Co.: west of Punta Gorda, *Small, Mosier & DeWinkeler 10915* (FLAS). Hardee Co.: Cattle-range station near Limestone, *Kirk*, 1942 (FLAS). Highlands Co.: south of Frostproof, *Small & DeWinkeler*, 1920 (GH); Avon Park, *J. Davis*, 1933 (FLAS); Istokpoga Prairie, north of Istokpoga Creek, *Small, Mosier & DeWinkeler 10900* (DUKE, PENN, TENN, WVA). Hillsborough Co.: Sun City, *Wood & Clement 7512, 7512a* (GH); Tampa Bay, *O'Neill*, 1927 (CAS, FLAS); Tampa, *Churchill*, 1897 (GH, MO); Ballast Point, West Tampa, *Churchill*, 1923 (GH, US); Sulphur Spring, Tampa, *Churchill*, 1923 (GH); Tampa, *Garber*, 1876 (F, NY, US); Uceta, near Tampa, *Bailey & Bailey 6720* (NY); Tampa Bay, *Hulse* (NY); Sutherland, *Barnhart 2761*. Indian River Co.: near Felsmere, *Small, DeWinkeler & Mosier 11110* (NY, US). Lee Co.: west of Fort Myers, *Moldenke 958* (DUKE, PENN, NY, US); Ft. Myers, *Harshberger*, 1912 (PENN), *Hitchcock 83* (GH, KSC, MO, NY, US), *Westgate 3355, 3404* (F); Punta Rasa, *J. Standley*, 1916 (US). Manatee Co.: Manatee River, *Rugel 156* (GH, NY); Palmetto, *Kelbert & Weber*, 1928 (FLAS); Bradenton, *Wheeler*, 1924 (F); Bradenton, *Cuthbert*, 1926 (FLAS): 6 mi. east of Manatee, *Oosting 172* (DUKE). Marion Co.: 3 mi. south of Orange Springs, *West & Arnold*, 1942 (FLAS). Orange Co.: *Murrill*, 1941 (FLAS); west of Bithlo on Route 50, *Wood & Clement 7191* (GH). Osceola Co.: Campbell Station, Kissimee, *Singletory 263* (DUKE); Boyce's Place, Kissimee, *Singletory*, 1936 (DUKE). Palm Beach Co.: 3 mi. west of Delray Beach, *Fox*, 1945 (WVA). Pinellas Co.: Pinellas Point, St. Petersburg, *M. Williams*, 1926 (PH, DUKE); Dunedin, *Tracy 6833* (F, GH, NY, US). Polk Co.: *J. D. Smith*, 1880 (US); sandy soil, Conine, *Goodale 69916* (GH); Winter Haven, *McFarlin 4797* (CAS); Bartow, *Buswell*, 1919 (MIAMI). Putnam Co.: 3 mi. south of Clay Co. line on U. S. Route 17, *Wood & Clement 7170* (GH); Palatka, *C. Williamson* (PH). Sarasota Co.: Sarasota, *Vanderbilt*, 1941 (NY); Venice, *Wood & Clement 7508, 7508a* (GH); Osprey, *B. H. Smith*, 1904 (PH, DUKE).

Seminole Co.: Longwood, *Beardslee*, 1928 (UC); Oviedo, *Walker 1748* (PH, PENN). St. Johns Co.: *Reynolds* (US); *J. D. Smith*, 1879 (US); 4 mi. west of St. Augustine, *West & Arnold*, 1940 (FLAS). Volusia Co.: Ormond, *Butts*, 1943 (GH); High Banks, 2.5 mi. south of Crows Bluff (Lake Co.), *R. & L. Hindery*, 1941 (FLAS).

Tephrosia Rugelii is an interesting species which stands apart from its relatives of the southeastern United States in its monopodial habit. The plant may be distinguished from other Florida species by its decumbent, monopodial stems, its 9–17 relatively small, uniform leaflets which are broadest above the middle and, particularly, by the flowers borne 1–3 in the axils of leaves. It is sometimes confused with *Tephrosia spicata* but that species branches sympodially, has leafless inflorescences with as many as 20 nodes and the flowers are borne in the axils of persistent bracts. The leaflets of *T. spicata* are generally larger.

The upper surfaces of the leaves of *T. Rugelii* are usually covered with fine hairs, but plants with the upper surfaces glabrous are known from two colonies in southwestern Florida (*Wood & Clement 7512a, 7508a*) where they occur with the typical form.

16. **Tephrosia spicata** (Walt.) T. & G.

Orobus virginianus, etc. Pluk. Mant. 142. 1700.

Clitoria foliis pinnatis, etc. L. Hort. Cliff. 498. 1737.

Erebinthus Mitch. Act. Nat. Cur. **8:** app. 210. 1748.

Cracca leguminibus retrofalcatis, etc. L. Nov. Pl. Gen. 31–32. 1751.

Cracca virginiana L. Sp. Pl. **2:** 752. 1753, in part. (GH-photograph of *Galega*, Sheet 5, Herb. L.)

Galega virginiana L. Syst. Nat. ed. 10. **2:** 1172. 1759, as to plant described.

Galega spicata Walt. Fl. Carol. 188. 1788. (GH-photograph of Type in Herb. Walt.)

Tephrosia spicata (Walt.) T. & G. Fl. N. Amer. **1:** 296. 1838.

Cracca spicata (Walt.) Kuntze, Rev. Gen. **1:** 175. 1891.

Tephrosia paucifolia Nutt. Gen. N. Amer. Pl. **2:** 119. 1818. "In Georgia and Florida, Dr. Baldwyn." (GH-ex Nuttall Coll., presented by Durand, 1866, marked "Tephrosia paucifolia, Southern States.")

Galega paucifolia (Nutt.) M. A. Curt. Bost. Jour. Nat. Hist. **1:** 122. 1835.

Tephrosia hispida DC. Prod. **2:** 250. 1825. "In Carolina."

Tephrosia hispidula γ T. & G. Fl. N. Amer. **1:** 297. 1838. "Middle Florida, Dr. Chapman."

Tephrosia flexuosa Chapm. MSS.; T. & G. Fl. N. Amer. **1:** 297. 1838, in syn. *T. hispidula* γ, not *T. flexuosa* G. Don. 1832.

Cracca spicata flexuosa Vail, Bull. Torr. Cl. **22:** 30. 1895, as new combination based on *T. flexuosa* Chapm., but actually the first valid publication of the name. "Florida, *Chapman*" (NY-Type).

Tephrosia villosa var. *flexuosa* (Vail) Robinson, Bot. Gaz. **28:** 200. 1899, new combination; *T. flexuosa* Chapm. and *C. spicata* var. *flexuosa* Vail cited.

Cracca flexuosa (Vail) Heller, Cat. N. Amer. Pl. ed. 2. 7. 1900, basonym erroneously attributed to Chapm.

Tephrosia mollissima Bertol. Mem. Acad. Sci. Bolog. **2:** 274. 1850. Alabama. Illustration: Bertol. Misc. Bot. **9:** pl. 3. 1851.

Tephrosia spicata var. *semitonsa* Fern. RHODORA **42:** 456. 1940. White sand of pine and oak woods at Round Gut, southwest of Franklin, Southampton County, Virginia, *Fernald & Long 11353*, 20 Sept. 1939 (GH-Type; NY, US).

Erect or decumbent perennial herb from a woody crown and a cylindrical, pale brown tap-root; stems 1–many, branching sympodially, flexuous, terete or angled, leafy from the base. Stems, petioles, rachises and petiolules strigose or hirtellous and hirsutulous to hirsute with yellowish or rusty hairs. Leaves ascending, principally 4–12 cm. long, the petioles 1–24 mm. (rarely 30 mm.) long, usually shorter than the lowermost leaflet; stipules lanceolate to linear, acute or acuminate, 8–9 mm. or less long, green, persistent; leaflets of the principal leaves 9–*11*–17, oblong-obovate to obovate or elliptic (or narrowly so) to oblong-elliptic, the apex very obtuse, mucronate, 11–27 mm. long, 6–13 mm. wide (occasionally 32 x 14 mm.), the terminal leaflet sometimes larger than the lateral (rarely 37 x 17 mm. or 40 x 22 mm.), the leaflets thin, finely hirtellous to hirsutulous or glabrous above, hirsutulous or short-strigose to hirsute or somewhat strigose (but the hairs not tightly appressed) beneath with yellowish or rusty hairs, the veins prominent, often reddish below. Principal inflorescences apparently opposite the leaves or terminal, 4–60 cm. long, erect or curving upward, generally exceeding the leaves, rigid, leafless, bearing flowers at 2–15 (occasionally 20) nodes which are often crowded above, the peduncle stout, terete, angled or sometimes flattened but not conspicuously so; buds 2–5 at a node, 1–3 of these developing and fruiting. Primary bracts lanceolate to linear, acute or acuminate, the lowermost 5–11 (–13) mm. long, the upper smaller, persistent, conspicuous, spreading; secondary bracts lanceolate to linear, acute or acuminate, 9 mm. or less long, that on either side of the primary bract very conspicuous, persistent. Pedicels stout, both hirtellous and hirsutulous or hirsute, 1–6(–8) mm. long, ascending. Dried flowers 12–17 mm. long. Calyx 6–7 mm. long, sparsely to densely hirtellous or hirsutulous or hirsute with cinereous and rusty hairs, the lobes somewhat variable, but usually deltoid to lanceolate (or linear), rather long-acuminate, the upper 2.5–5 mm. long, the lateral 3–5 mm. long, the lowermost 4–6 mm. long. Corolla white (the back of the banner yellowish, faintly veined with red), becoming pink and then carmine with age and purple upon drying; blade of the banner subquadrate to suborbicular, 11–15 mm. high, 11–15 mm. broad; wings 13–15 mm. long,

auricled; keel 12–13 mm. long, with or without an auricle. Staminal tube 8–10 mm. long, the vexillary stamen free, with a distinct, usually 3-lobed callosity on the upper side near the base. Ovary densely short-strigose or rarely glabrous except along the upper suture. Legume slightly curved downward, 3–5 cm. long, 4.5–6.5 mm. wide, usually ascending, hirsutulous with yellowish or rusty spreading hairs or very rarely nearly glabrous except along the upper suture; seeds 6–15, subglobose or flattened on the ends through crowding, 2.4–2.8 mm. in diameter, black to brown or gray, variegated with black. Somatic chromosomes 22. Flowering collections in January in southern Florida, late April to late June in the North and through August into September in most parts of the range.

DISTRIBUTION. Dry or well-drained, usually sandy soils in open woods and pinelands, Sussex County, Delaware, southward to Dade County, Florida, and westward to Holmes and Wilkinson Counties, Mississippi, and Calcasieu Parish, Louisiana, with scattered stations in eastern Tennessee and southeastern Kentucky. Map 9.

REPRESENTATIVE SPECIMENS. UNITED STATES. DELAWARE. Sussex Co.: *Canby*, 1863 (GH, MO); Laurel, *Commons*, 1880 (MO, NY, PH); Georgetown, *Williamson*, 1908 (PENN, PH), *Britton 6* (NY). MARYLAND. Wicomico Co.: Salisbury, *Shreve & Jones 1276* (US), *Moyer*, 1867 (US), *Wherry & Pennell 12821* (PH), *Bebb*, 1863 (F, MO). Worcester Co.: Ferry Creek, *Redmond 404* (DS); Snow Hill (GH).

VIRGINIA. Greenville Co.: Quarrel's Creek below Pair's Store, *Fernald & Lewis 14622* (GH). Henrico Co.: Elko, *Wherry & Pennell 12477* (MO, PH). Isle of Wight Co.: south of Zuni, *Fernald & Long 6611* (GH, NY, PENN, US). Mecklenberg Co.: 9 mi. north of Clarksville, *White*, 1945 (GH). Nansemond Co.: Kilby, *Fernald, Long & Fogg 4892* (GH, PENN). Princess Anne Co.: Creed's, *Fernald & Long 3973* (GH, PENN). Prince George Co.: 3 mi. s.e. of Petersburg, *Fernald, Long & Smart 5806* (GH, NY, PENN). Southampton Co.: Round Gut, s.w. of Franklin, *Fernald & Long 11353* (GH, NY, US); Franklin, *Heller 1028* (CAS, DS, GH, MO, NY, PENN, PH, UC).

NORTH CAROLINA. Bladen Co.: Elizabethtown, *Heller 14032* (DS). Brunswick Co.: 3.5 mi. n.e. of Bolivia, *Wood & Clement 7050* (GH). Catawba Co.: swamp north of Hickory, *Small & Heller 31* (CAS, NY, PH, US). Cherokee Co.: s.w. corner of county, *Correll 3583* (DUKE). Chowan Co.: Edenton, *L. & F. Randolph 619* (GH). Cumberland Co.: *Blomquist 3906* (DUKE). Currituck Co.: Currituck, *Bartley & Pontius 437* (NY). Dare Co.: Roanoke Island, *Schallert*, 1941 (NY, UC). Gates Co.: Gatesville, *Godfrey 5222* (GH). Granville Co.: Little River, Camp Butner, *Patten 180* (DUKE). Halifax Co.: Weldon, *Canby*, 1878 (F), *Williamson*, 1895 (PH). Harnett Co.: Erwin, *Godfrey 4627* (DUKE, GH, US). Hyde Co.: 4 mi. s.e. of Leechville, *Wiegand & Manning 1565* (GH, POM). Iredell Co.: Statesville, *Hyams*, 1879 (KSC, MO, NY, POM). Johnston Co.: 5 mi. north of Newton Grove, *Hood 147* (MO), *Rogers 192* (DUKE). Macon Co.: Franklin, *Dunham 22* (F). Moore Co.: Southern Pines, *Blankinship*, 1895 (GH). Nash Co.: Middlesex,

Blomquist 6635 (DUKE). New Hanover Co.: Carolina Beach, *Godfrey 4702* (GH). Onslow Co.: Swansboro, *Wood 6483* (GH). Pamlico Co.: Arapahoe, *Oosting 33227* (DUKE). Pitt Co.: 15 mi. s.e. of Greeneville, *Blomquist 11236* (DUKE). Polk Co.: Godshaw Hill, Tryon, *Peattie 970, 980* (F). Richmond Co.: 5 mi. s.w. of Rockingham, *Wood & Clement 7608* (GH). Rockingham Co.: Spray, *DeChalmot* (US). Rutherford Co.: Chimney Rock. *Biltmore Herb. 1395b* (GH, MO, NY, US). Rowan Co.: Salisbury, *Heller*, 1890 (F, MO, NY, PENN, PH, UC). Sampson Co.: Clinton, *Atchison 38* (GH). Stanley Co.: Falls of the Yadkin River, *Small*, 1892 (NY, PH). Transylvania Co.: Falloway, *Coughey 373* (DUKE). Wake Co.: Lake Myra, *Blomquist 3093* (DUKE). Washington Co.: Roper, *Godfrey 4286* (GH, US). Wilson Co.: *Pattern 131* (DUKE).

South Carolina. Aiken Co.: Aiken, *Ravenel* (NY, US). Anderson Co.: Anderson, *J. Davis*, 1919 (TEX). Berkeley Co.: St. Stephens, *Martin* 1752 (DUKE). Beaufort Co.: Beaufort, *Wood & Clement 7106* (GH). Charleston Co.: Charleston, *W. Palmer*, 1902 (GH, US). Chesterfield Co.: 2 mi. s.w. of McBee, *Wood & Clement 7600* (GH). Darlington Co.: Hartsville, *B. Smith*, 1932 (NY). Florence Co.: 6 mi. south of Florence, *Wiegand & Manning 1567* (GH). Georgetown Co.: 5.5 mi. south of Georgetown, *Godfrey & Tryon 203* (CAS, DUKE, GH, MO, NY, US). Greenville Co.: *J. D. Smith*, 1881 (US). Horry Co.: 15.8 mi. north of Myrtle Beach of Route 17, *Wood & Clement 7072* (GH). Lexington Co.: 14 mi. south of Columbia, *Godfrey & Tryon 1310* (GH, NY, US). Marlboro Co.: 2 mi. south of N. Carolina boundary on U. S. Route 1, *Wood & Clement 7606* (GH). Oconee Co.: Keowee, *House 2203* (NY, US). Pickens Co.: Calhoun, *House 3498* (NY); Table Rock, *Rodgers*, 1941 (DUKE). Spartanburg Co.: Campobello, *E. Walker 3485* (DUKE). Sumter Co.: Sumter, *Brownfield*, 1894 (US). Williamsburg Co.: Santee River, 17 mi. south of Kingstree, *Wiegand & Manning 1568* (GH).

Georgia. Bartow Co.: 3 mi. south of Allatoona Dam, *Duncan 8420* (UC). Camden Co.: 2 mi. north of Kingsland, *Wood & Clement 7131* (GH). Chatham Co.: Wilmington Id., Ft. Pulaski National Monument, *Eyles 4112* (DUKE). Clarke Co.: Athens, *Perry 909* (GH, PENN, NY, US). DeKalb Co.: Stone Mt., *Eggert*, 1897 (NY, TEX, UC, US). Dougherty Co.: Albany, *Pollard & Maxon 510* (NY, US). Fannin Co.: Blue Ridge, *Huger*, 1900 (NY). Floyd Co.: Mt. Berry, *H. Jones*, 1935 (GA). Fulton Co.: East Point, *Scheer*, 1916 (GA). Gwinnett Co.: Thompsons Mills, *Allard 110* (NY, US). Houston Co.: Wellston, *Ainsworth 44530* (PH). Jasper Co.: Monticello, *Porter*, 1846 (GH, F, PH). Jefferson Co.: *Hopkins*, 1897 (NY). Lamar Co.: Barnesville, *Hamlin E7856* (GA). Rabun Co.: Clayton, *Reade*, 1911 (DUKE). Richmond Co.: 15 mi. s.w. of Augusta, *Wood & Clement 7582* (GH). Spalding Co.: Pomona, *Riegel*, 1899 (KSC). Ware Co.: *Erlanson 292* (US). Washington Co.: 25 mi. west of Sandersville, *Erlanson 333* (GA, US). Whitfield Co.: west of Dalton, *Harper 397* (NY).

Florida. Broward Co.: between Ft. Lauderdale and Miami, *Small, Carter & Small*, 1911 (NY); west of Davie, *Moldenke 455*, 1930 (NY, PENN). Clay Co.: 7 mi. south of Green Cove Springs, *Wood & Clement 7166* (GH). Columbia Co.: 5 mi. east of Fort White, *West & Arnold*, 1946 (FLAS). Dade Co.: Humbugus Prairie (between Miami and Fulford), *Small, Mosier & Small 6890* (DUKE, FLAS, GH, NY, PENN, TENN, WVA, US). Dixie Co.: 10 mi. west of Shamrock, *Pasture Survey*, 1937 (FLAS). Duval Co.: Jacksonville, *Curtiss 580* (A, GH, MO, NY, PENN, PH, US), *4232* (DS, NY, UC, US), *6419* (DS, GH, MO, NY, UC, US). Escambia Co.: Pensacola, *Brinker 51* (MO, UC). Franklin Co.: Apalachicola, *Chapman* (DS, MO). Hillsborough Co.: Riverview, *Wood & Clement 7516* (GH). Lake Co.: Eustis, *Hitchcock*, 1894 (F, FLAS, KSC, MO), *Nash 754* (GH, MO, NY, POM, UC, US). Lee Co.: Ft. Myers, *J. Standley 167* (CAS, DS, GH, NY, PH, UC, US). Leon Co.: Tallahassee, *Berg*, 1895 (F, NY). Levy Co.: Raleigh, *Wood & Clement 7531* (GH). Liberty Co.: north of Roy, *Wiegand & Manning 1571* (GH). Manatee Co.: Bradenton, *Weber*, 1928 (FLAS). Marion Co.: Irvine, *Moldenke 1089a* (NY, PENN). Pasco Co.: St. Leo, *O'Neill* (FLAS). Polk Co.: Ft. Meade, *J. D. Smith*, 1880 (US); Bartow, *McFarlin 555* (TEX). Seminole Co.: Forest City, *Lewton*, 1894 (NY). Suwanee Co.: Live Oak, *Wiegand & Manning 1569* (GH, PENN). Volusia Co.: Orange City, *Hood*, 1910 (FLAS). Walton Co.: 18 mi. east of Freeport, *Erlanson 222a* (US).

Kentucky. McCreary Co.: high ridge above Coffee Branch, *Braun 4259* (GH, Herb. Braun). Whitley Co.: Cumberland Falls, *Braun 627* (Herb. Braun), *McFarland*, 1940 (CAS, DUKE, GA, GH, MO, NY, PH, TENN, UC, WVA). Tennessee. Cocke Co.: Wolf Creek, *Kearney*, 1894 (F, GH, MO, NY, US); French Broad River between Paint Rock and Del Rio, *Kearney 642* (MO, NY, US). Hamilton Co.: Missionary Ridge, Chatanooga, *Freeman & Freeman*, 1921 (US); Lookout Mt., *Vasey*, 1878 (PH). Knox Co.: 2 mi. s.w. of Univ. Tenn. Farm, *Hesler 3021* (NY, TENN). Loudon Co.: just east of Roane Co. line on U. S. Highway 70, *Sharp & Clebsch 6878* (TENN). Marion Co.: ridge west of Whitwell, *Sharp & Underwood 2586* (TENN). Meigs Co.: Decatur, *Underwood & Sharp 2297* (PENN, TENN).

Alabama. Baldwin Co.: Magnolia Springs, *Schallert 817* (DUKE). Blount Co.: *Mohr*, 1889 (US). Cherokee Co.: Lookout Mt., *Freeman*, 1905 (KSC). Crenshaw Co.: Dozier, *Reed 2100* (TEX). Cullman Co.: Cullman, *Sudworth*, 1891 (US). Escambia Co.: Atmore, *Blanton 195* (GH). Jackson Co.: DeSoto Falls, *Wherry*, 1933 (PENN). Jefferson Co.: Birmingham, *Hitchcock*, 1898 (F). Lee Co.: Auburn, *Earle & Baker*, 1897 (GH, KSC, MO, NY, US). Macon Co.: Notasulga, *Underwood*, 1896 (NY). Marshall Co.: 3.2 mi. north of Boaz, *Hubricht B1665* (MO). Mobile Co.: Mobile, *Mohr* (DS, US). Shelby Co.: Calera, *Everts* (NY). St. Clair Co.: Cook Spring, *Barnhart 554* (NY). Tallapoosa Co.: *Pollard & Maxon 135* (US). Tuscaloosa Co.: Tuscaloosa, *E. A. Smith*, 1893 (US).

Mississippi. Clarke Co.: Enterprise, *Tracy 3268* (part) (NY). Holmes Co.: *McGee*, 1892 (NY). Jackson Co.: Ocean Springs, *Seymour 46* (CAS, DUKE, GH, MO). Jasper Co.: Heidelburg, *Tracy 3226* (MO). Pearl River Co.: *Erlanson 178* (US). Pike Co.: Holmesville, *Wheeler* (MO). Smith Co.: Taylorville, *Tracy 8501* (GH, MO, NY, PENN, US). Wayne Co.: Waynesboro, *Pollard 1225* (GH, MO, NY, US). Wilkinson Co.: *Phares 1704* (KSC). Louisiana. Calcasieu Parish: Lake Charles, *Allison 59* (US). St. Tammany Parish: Covington, *Langlois*, 1895 (DS), *Bro. Arsène 11510, 11579*, etc. (US). Tangipahoa Parish: 3 mi. south of Hammond, *Erlanson 148* (US).

Tephrosia spicata is likely to be confused only with *T. Rugellii* (see discussion of that species) and with *T. hispidula* among the species of the southeastern United States. Although plants of *T. hispidula* with spreading pubescence have been identified by Rydberg and others as *T. spicata*, the two are quite different, particularly in the calyx, leaflet-number, -shape and -size, and inflorescence, as indicated in Key 2.

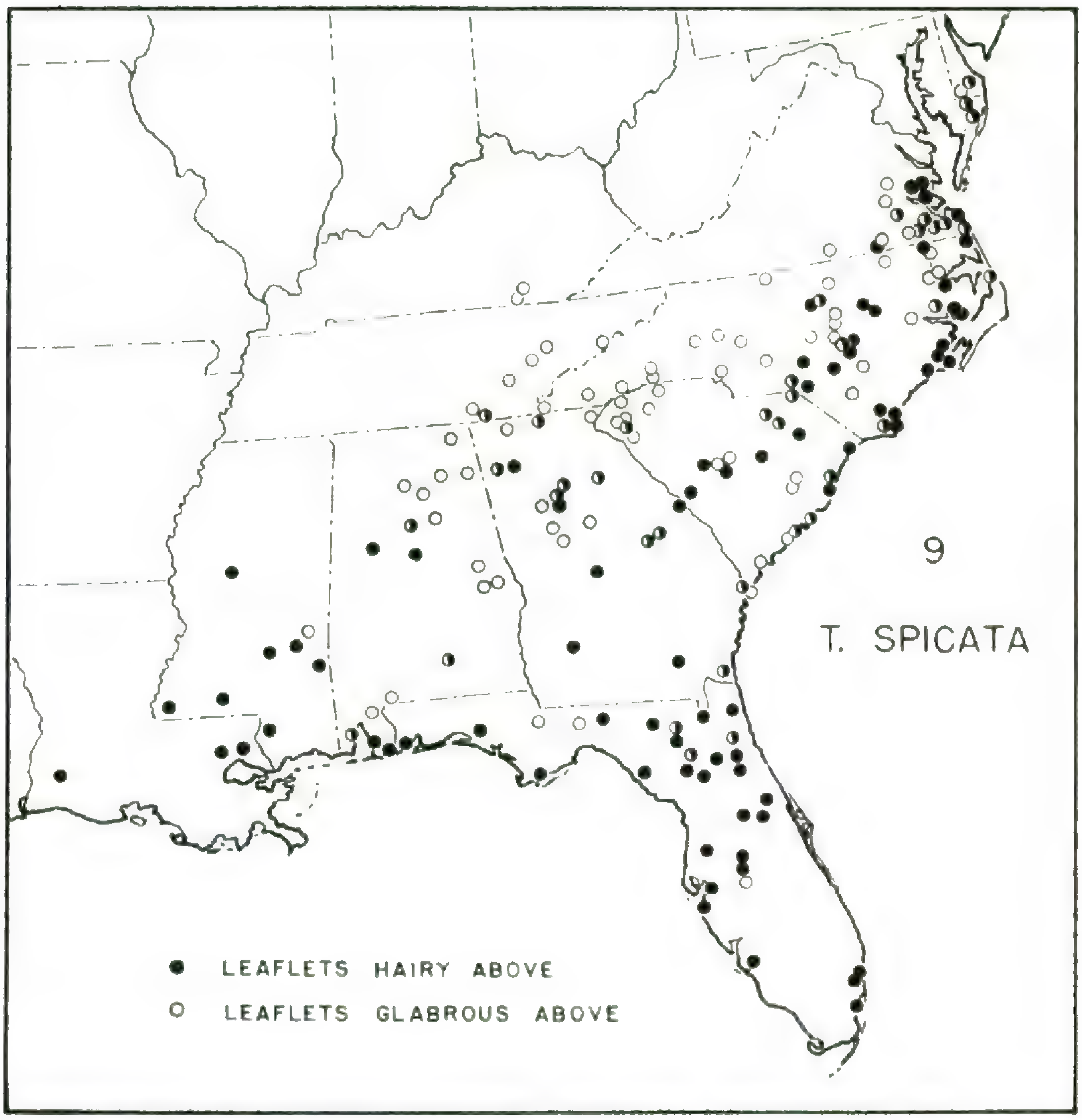
Two pubescence-forms of *Tephrosia spicata* occur, one with the upper surfaces of the leaflets completely glabrous, the other with the upper surfaces hirtellous or hirsutulous in varying degrees. A few intermediates are also found. No other differences between the two types are evident. The partially glabrous form has been designated *T. spicata* var. *semitonsa* Fernald (Walter described the hairy plant), but its importance as a geographical segregate is greatly weakened by the occurrence of both types of plants throughout most of the range of the species. Indeed, both may occur within the same colony, although the proportions vary from place to place. Few large collections are available, but three made in the summer of 1947 are interesting in this connection:

	Plants with leaflets hairy above	Plants with leaflets glabrous above
Beaufort Co., N. C.	53 (98.2%)	1 (1.8%)
Georgetown Co., S. C.	26 (99.3%)	2 (0.7%)
Charleston Co., S. C.	32 (60.5%)	21 (39.5%)

Colonies consisting entirely of either type were also found. Map 9 indicates further the large number of localities or collections in which both glabrous and hairy plants occur. The slight segregation of the glabrous form in western North Carolina and eastern Tennessee and Kentucky and of hairy plants in Louisiana and

part of Florida may be more apparent than real, but this can be determined only by more careful collecting.

A peculiar, little-known form with linear leaves 1–5 cm. long and 2–6 mm. wide has been named *Cracca flexuosa* (Vail) Heller. The specimens all appear to have been stiffly erect and some give



Map. 9. Distribution of Tephrosia spicata. Half-filled circles indicate the occurrence of both pubescence-types in the same collection or at the same locality. See accompanying text.

the impression of having been injured. The inflorescences, which bear 1–8 flowering nodes, are usually partly leafy. The legume, calyx and coarse, over-all pubescence are, however, characteristic of *Tephrosia spicata*, of which this appears to be merely a form. The following specimens are referable to this name:

Florida. *Chapman* (MO, NY, PH); probably collected by *Chapman* (F). Alabama. *Dr. Gates* (NY); ? Mobile, *Mohr* (F). Mobile Co.: dry, sandy pine barrens, Spring Hill, *Mohr*, Aug. 1878 (US). Mississippi. Jackson Co.: Ocean Springs, *Tracy*, 11 June 1898 (MO). Harrison Co.: Gulfport, *Lloyd & Tracy 161*, 8 Sept. 1900 (NY).

17. **Tephrosia hispidula** (Michx.) Pers.

Galega hispidula Michx. Fl. Bor. Amer. **2:** 6. 1803. "In Virginia, Carolina et Georgia." (GH-photograph of Type in Herb. Mus. Paris.)

Tephrosia hispidula (Michx.) Pers. Syn. Pl. **2:** 329. 1807.

Cracca hispidula (Michx.) Kuntze, Rev. Gen. **1:** 175. 1891.

Tephrosia gracilis Nutt. Gen. N. Amer. Pl. **2:** 119. 1818. "In Carolina and Georgia" (GH).

Tephrosia elegans Nutt. Jour. Acad. Phila. **7:** 105. 1834, not Schum. ex Schum. & Thonn. 1827. "Hab. in Alabama." The description applies most nearly to *T. hispidula*, although it is not very definite. I have, however, seen no material of this species from Alabama.

Erect or decumbent perennial herb up to 5 dm. high from a slender woody crown and dark-brown, woody, fusiform tap-root, up to 3 dm. long, 1 cm. thick, which sometimes bears a few short branch roots near the upper end; stems slender, branching sympodially or partially so. Stems, petioles, rachises and axes of the inflorescences sparsely to densely strigillose to short-strigose or hirsutulous with cinereous or brownish hairs. Leaves (3–)5–10(–11) cm. long, ascending, the petioles mostly very short and the leaves nearly sessile or the petioles up to 8 (very rarely 5–20) mm. long, shorter than the lowermost leaflets; stipules linear-acuminate to linear-setaceous, 5–8 mm. or less long, persistent; leaflets of the principal leaves (9–)13–19(–23), oblong to ovate-lanceolate to narrowly elliptic (rarely elliptic or ovate), the apex acute or obtuse but not rounded, mucronate, the base rounded or merely obtuse, 7–22 mm. long, 2–7 mm. wide (very rarely 12 x 7 to 16 x 18 mm.), mostly 2–3 times as long as broad; leaflets membranous, dull, red-veined beneath, glabrous to densely strigillose or hirtellous with cinereous hairs above, sparsely to densely strigillose or hirtellous to hirsutulous with cinereous hairs beneath; petiolules 1 mm. or less long. Inflorescences opposite the leaves, terminal or axillary, slender, (1.5–)2.5–15 cm. long, erect or ascending, usually exceeding the leaves and naked or sometimes with a single leaf, bearing 1–3(–5) flowering nodes near the end; buds 2–3 at a node, one of these fruiting. Primary bracts persistent, narrowly lanceolate to linear-lanceolate, the lowermost often 3-toothed or -parted to the base, 5–7(–9) mm. long. Pedicels slender, almost filiform in flower, becoming stouter in fruit, 2–8 mm. long, ascending. Dried flowers 12–15 mm. long. Calyx 3–4 mm. long, strigillose and short-strigose or hirtellous and hirsutulous with cinereous hairs, the upper and lateral lobes deltoid, abruptly contracted near the tip, 1.5–2(–2.5) mm. long and 1.5–2.5(–3.5) mm. long, respectively, the lowermost lobe narrowly deltoid, acuminate, to lance-acuminate, 2–3(–3.5) mm. long. Corolla white (the back of the banner yellowish, faintly veined with red), becoming

pink and then carmine with age and purple upon drying; blade of the banner rounded-quadrate, 10–12 mm. high, 11–14 mm. broad, hairy on the back; wings 10–14 mm. long, auriculate; keel 10–11 mm. long, auriculate. Staminal tube 8–10 mm. long, the vexillary stamen free, sometimes distinctly thickened on the upper side near the base. Ovary densely short-strigose with stiff, coarse, cinereous or golden hairs. Legume slightly curved downward, 3–4.2 cm. long, 4.5–6 mm. wide, horizontal or ascending, sparsely to moderately hirsutulous with yellowish to cinereous hairs; seeds 10–12, Boston-baked-bean-shaped, 2.6–3.4 mm. long, gray or brown, variegated with black. Somatic chromosomes 22.

Distribution. Dry to moist, or even wet, acid, sandy soils, chiefly in flat pinelands and savannahs on the outer Coastal Plain of the United States from southeastern Virginia (?) and Beaufort and Cumberland Counties, North Carolina, southward to Polk and Osceola Counties, Florida, and with a single collection from Jackson County, Florida. Map 13.

Representative specimens. In most instances, only a single collection is cited from a county.

UNITED STATES. Virginia. Without locality, *Torrey & Gray*, Fl. N. Amer. (GH). North Carolina. Beaufort Co.: savannah, Chocowinty, *Godfrey*, 1938 (GH); savannah, 9.4 mi. south of Washington, *Wood & Clement 6992* (GH, DUKE). Bladen Co.: moist, sandy soil, east of Elizabethtown, *Heller 14056* (DS). Brunswick Co.: 3.5 mi. northeast of Bolivia, *Wood & Clement 7049* (GH). Craven Co.: pine savannah, 3.25 mi. north of Havelock, *Wood & Clement 7004* (GH). Carteret Co.: wet soil, open pineland, Silverdale, *Randolph & Randolph 933* (GH). Columbus Co.: Whiteville, *Schallert 9402* (DUKE); savannah, Old Dock, *Godfrey & Shunk 4191* (GH, US). Cumberland Co.: *Godfrey 4551* (GH, US). New Hanover Co.: savannah s.e. of Wilmington, *Coville 67* (US). Onslow Co.: pineland at Richlands, *Godfrey 4484* (GH, US). Pender Co.: Burgaw, *Blomquist 3904* (DUKE). Robeson Co.: 7 mi. s.e. of Lumberton, *Wiegand & Manning 1555* (GH).

South Carolina. Santee Canal, *Ravenel* (GH). Berkeley Co.: dry, sandy woods, 14 mi. south of Charleston, *Moldenke 1221* (DUKE, NY, PENN, US). Clarendon Co.: 2 mi. north of Manning, *Stone 122* (PH). Dorcester Co.: open pine woods, Summerville, *Hexamer & Maier*, 1855 (GH). Georgetown Co.: upland grass-sedge bog or savannah, 5 mi. south of Andrews, *Godfrey 145* (CAS, GH, MO, NY, US). Hampton Co.: sandy, peaty barrens 3 mi. n.w. of Early Branch, *Wiegand & Manning 1557* (GH, POM). Williamsburg Co.: 4 mi. north of Kingstree, *Wiegand & Manning 1556* (GH).

Georgia. *Nuttall* (GH). Bulloch Co.: dry pine barrens, *Harper 849* (GH, NY, US). Camden Co.: wet pineland, ca. 2 mi. north of Kingsland, *Wood & Clement 7133* (GH). Chatham Co.: Whitemarsh Id., Ft. Pulaski National Monument, *Eyles 4331* (DUKE). Emanuel Co.: moist pine savannah at edge of oak barren, 3 mi. north of Oak Park, *Wood & Clement 7566* (GH). Glynn Co.: just west of Brunswick, *Wood & Clement 7120*

(GH). McIntosh Co.: damp pine woods, 7 mi. north of Darien on Route 17, *Wood & Clement 7115* (GH). Screven Co.: fine sandy soil at edge of "bay", 9 mi. east of Millen, *Duncan 5544* (GA). Ware Co.: moist pine woods, 14 mi. s.w. of Waycross, *Wood & Clement 7552* (GH). Wayne Co.: sandy soil near Jessup, *Biltmore Herb. 1389f* (US).

FLORIDA. *Nash 1428, 1480, 922* (NY); *Chapman* (GH, MO, NY); *Powell*, 1872 (US); *Curtiss*, 1875 (US). Alachua Co.: Gainesville, *Garber* (CAS, NY, US), *Weber*, 1933 (FLAS). Clay Co.: Penney Farms, *Ritchey*, 1934 (FLAS). Columbia Co.: Lake City, *Hitchcock*, 1898 (F, MO); moist pineland, 7 mi. north of Lake City, *Wood & Clement 7549a* (GH). Duval Co.: near Jacksonville, *Curtiss 581* (GH, MO, NY, PENN, PH, POM), *4230* (DS, NY, UC, US), *5682* (FLAS, GH, KSC, MO, NY, POM, UC, US). Jackson Co.: 4 mi. east of Marianna, *Erlanson 229* (GH). Lake Co.: vicinity of Eustis, *Nash 804* (GH, MO, NY, PH, UC, US). Lee Co.: open woods south of Ft. Myers, *Wherry*, 1930 (PENN). Levy Co.: flatwoods near Lebanon, *Pasture Survey*, 1937 (FLAS). Marion Co.: 1.5 mi. east of Orange Springs, *West & Arnold*, 1941 (FLAS). Nassau Co.: wet pineland, just north of Gross, *Wood & Clement 7136* (GH). Orange Co.: *Meislahn 44* (US); *Baker*, 1934 (MIAMI); Lake Brantley, *Lewton*, 1893 (NY); wet pineland, Christmas, *Wood & Clement 7194* (GH). Osceola Co.: *Mearns*, 1901 (US). Pinellas Co.: St. Petersburg, *M. Williams*, 1926 (PH, DUKE). Polk Co.: Bartow, *Buswell*, 1919 (MIAMI). Putnam Co.: low turkey-oak woods, Welaka, *Laessle*, 1940 (FLAS). St. Johns Co.: 1.8 mi. north of Switzerland, *Murrill*, 1941 (FLAS). Union Co.: 5 mi. south of Raiform, *West & Arnold*, 1942 (FLAS).

Tephrosia hispidula is remarkable among the Tephrosias of the southeastern United States in inhabiting moist or even wet pinelands, although it is not confined to such habitats and often grows in well-drained, sandy soils. All of the other southeastern species seem to require very well-drained soils. The slender, erect or decumbent plants of this species, however, may regularly be looked for in southeastern North Carolina in moist pine savannas where they often occur with *Dionaea*. In coastal Georgia I have seen the species growing with *Sarracenia* and in northern Florida on slight rises in wet pineland. Although it occurs in dry pinelands as well, it appears to be absent from oak-barrens and is thus usually ecologically isolated from *Tephrosia florida* and always from *T. chrysophylla*. *Wood & Clement 7567*, 3 mi. north of Oak Park, Emanuel Co., Ga. (GH), consists of plants morphologically intermediate between *T. hispidula* and *T. florida*. These grew in a narrow transition zone between pine grassland and an oak-barren where the two species grew and may represent hybrids. (See DISTRIBUTION AND ECOLOGY.)

All reports of *Tephrosia hispidula* from Alabama, Mississippi and Louisiana seem to be based on small or depauperate plants of *T. florida* which sometimes resemble this species in vegetative characters. I have seen no specimens from west of Jackson County, Florida. Although the calyx of *Tephrosia hispidula* resembles that of *T. florida,* the ovary and legume are short-strigose or hirsutulous in the former and merely strigillose or hirtellous in the latter.

Pubescence of the leaflets in this species follows the four types described under *Tephrosia onobrychoides,* although plants with the upper surfaces of the leaflets glabrous and the pubescence on the lower surfaces spreading are rare. There is no geographical segregation of any of these types; two or more often occur in the same colony. Only three large collections have been made but these show more or less random distribution of pubescence-types. For example, in one from Beaufort County, North Carolina, consisting of 77 plants, the leaflets of 36 were glabrous above and strigillose beneath, while 23 were appressed-pubescent on both surfaces and 18 spreading-pubescent on both surfaces!

(To be continued)

CAMPANULA RENTONAE, SP. NOV.

Robert M. Senior

Planta perennis, stolonifera; caules steriles foliati, folia spathulata vel subrotundata, ca. 6 mm. longa, in petiolum 6–12 mm. longum abrupte attenuatum; caules floriferes 3–12 cm. longi, sparse foliati (1 vel plerumque 2–4), folia basalia plura, rosulatim aggregata, anguste lanceolata vel elliptica, sessilia, acuta, integra vel denticulata, breve albociliata, 1–3.5 cm. longa et 3–6 mm. lata, nervus primarius prominens. Inflorescentia flos solitarius, terminalis, in alabastro suberectus, anthesin plerumque nutans; corolla violacea vel roseo-violacea, tubus ad basin pallidior, ad 1 cm. longa et lata, lobi acuti, subpatuli, dimidio liberi; calyx ca. 4 mm. longus, subnervatus, glaber vel breve pubescens, lobi acuti, anguste triangulares, integri vel denticulati, anthesin patuli, ad 5 mm. longi; stylus tripartitus, corollam longitudine aequans vel subaequans; antherae flavae. Semina minuta, brunnea, subnitida, capsula ad apicem dehiscens.

Rootstocks thin, creeping, sending up sterile and flowering stems; sterile shoots with tiny spatulate, almost rotund, leaves about 6 mm. long, narrowed abruptly into a 6–12 mm. petiole,

these leaves usually dying at anthesis; basal leaves of flowering stems in a rosette, acute, sessile, narrowly lanceolate, entire or denticulate, 1–3.5 cm. long, 3–6 mm. wide, with a distinct light-green midrib, the margins with short white cilia; flowering stems rising from near the centers of the rosettes, each stem bearing sometimes 1 but usually 2–4 distant leaves, the uppermost almost linear, the stem 3–12 cm. tall, bearing one terminal flower, fairly erect in bud, often nodding in anthesis; corolla violet to pinkish-violet, the base of the tube lighter in color, usually less than 1 cm. long and about as wide, the lobes acute, slightly spreading, and cut halfway; calyx about 4 mm. long, faintly ribbed, glabrous or with short white hairs, the calyx-lobes acute, narrowly triangular, entire or denticulate, spreading at anthesis, about one-half the length of the corolla; style 3-parted, about the length of the corolla; anthers yellow; seeds very small, brown, rather shiny, the capsule dehiscing toward the upper part of the calyx. Perennial.

This *Campanula* was found by Mrs. *Izetta M. Renton,* North Bend, Washington, on MT. STUART, in CHELAN COUNTY, WASHINGTON, at an altitude ranging between 7000 and 8000 ft. Mrs. Renton sent me seeds, asking me to raise the plants and endeavor to identify the species. In the herbaria that I have visited, I have found no species of *Campanula* resembling this plant, nor have I been able to discover any written account of a similar species. The leaves of the sterile shoots, as well as those of the basal rosette, are distinctive. There is however some variation in the different plants raised. Occasionally the leaves are entire, but usually denticulate. The length of the flowering stems also varies considerably, some being less than 3 cm. long, others attaining a height of 12 cm. Again, some of the calyx-lobes are entire, some faintly denticulate. I am depositing the TYPE in the Gray Herbarium.

CINCINNATI, OHIO

HELENIUM CURTISII IN VIRGINIA.—On May 4, 1949, I found a strange *Helenium* in flower in a forested marsh about three miles west of Williamsburg in James City County, Virginia. On May 15, I returned to that station and collected a series of specimens: *Baldwin 12553.* One specimen was deposited in the Gray Herbarium; others were distributed via Dr. S. F. Blake.

Prof. M. L. Fernald determined the plant to be *Helenium Curtisii* Gray, previously known only from Wake County, North Carolina, in bogs in the vicinity of Raleigh. It is the second spring-flowering representative of the genus to be discovered in southeastern Virginia: see Fernald (RHODORA **41:** 491. 1939) for record of discovery of *Helenium brevifolium* in Greensville County.

Helenium Curtisii was present in considerable numbers. The plants grew in a small streamlet or in the adjacent boggy situations. There too were *Medeola virginiana*, *Trillium pusillum* var. *virginianum*, and *Lilium canadense* (?). Small trees and shrubs were frequent. And *Smilax rotundifolia* made the place difficult of entry.—J. T. BALDWIN, JR., College of William and Mary.

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CONTENTS:

Contributions from the Gray Herbarium of Harvard University—No. CLXX. The American Barbistyled Species of Tephrosia (Leguminosae). *Carroll E. Wood, Jr.* 305

Veronica filiformis a Weed of Lawns and Gardens. *W. C. Muenscher.* 365

An Indispensable Bibliography (Review of Rehder's Bibliography of Cultivated Trees and Shrubs). *M. L. F.* 365

Chromosomes of Trillium pusillum, var. virginianum. *J. T. Baldwin, Jr.* 368

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2. The Variation of some Boreal Carices. With 5 plates. By M. L. Fernald. $1.00

No. XXIII. Reprinted from Am. Journ. Sci. Ser. 4, xiv: 167–194. 1902.
The Relationships of some American and Old World Birches. With 2 plates. By M. L. Fernald. .... $ .40

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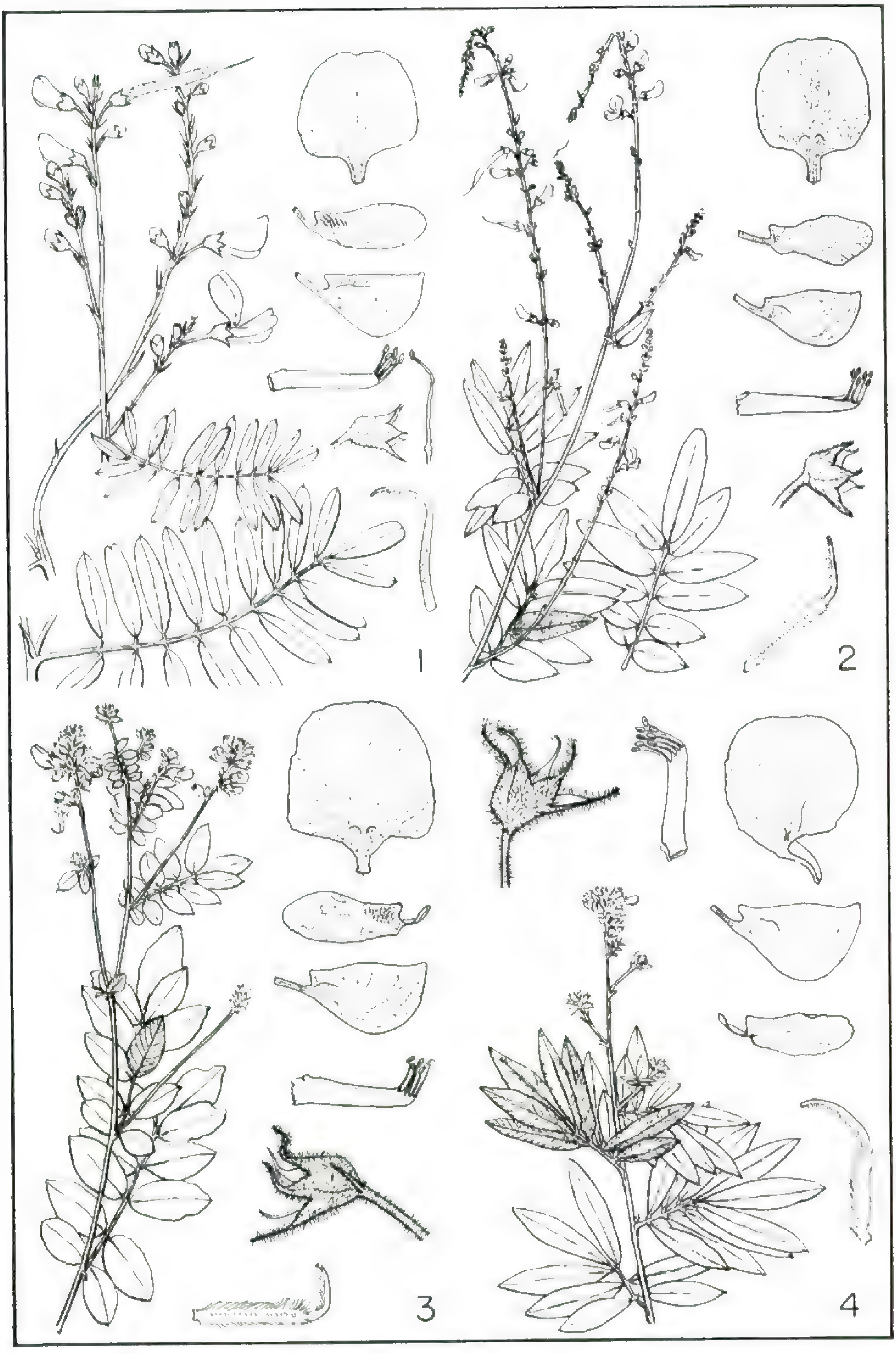

C. E. W. del.

New Barbistyled Species of Tephrosia. 1. T. saxicola (habit, isotype-UC; details, Type-GH). 2. T. mexicana (Type-GH). 3. T. pogonocalyx (Type-GH). 4. T. vernicosa (habit, isotype-GH; details, Type-NY). All details, × 1; habit, Fig. 1, × ½; habit, Figs. 2, 3, 4, × ¼.

Rhodora

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—No. CLXX

THE AMERICAN BARBISTYLED SPECIES OF TEPHROSIA (LEGUMINOSAE)

Carroll E. Wood, Jr.

(*Continued from page 302*)

18. **Tephrosia florida** (F. G. Dietr.) comb. nov.

Galega villosa Michx. Fl. Bor. Amer. **2:** 67. 1803, not. L. 1753. Carolina to Florida. (GH-photograph of Type in Herb. Mus. Paris.)

Tephrosia villosa (Michx.) Pers. Syn. Pl. **2:** 329. 1807, not (L.) Pers. 1807.

Galega florida F. G. Dietr. Vollst. Lexik. Gaertn. Nachtr. **3:** 422. 1817. Carolina and Florida. Based on *Galega villosa* Michx. See discussion below.

Galega ambigua M. A. Curtis, Bost. Jour. Nat. Hist. **1:** 121. 1835. "Sandy woods," (near Wilmington, North Carolina). (NY-specimen labeled "*Galega ambigua*, mihi; G. hispidula, P[urs]h. Ell[iott]. non M[ichau]x., N. Carolin, Curtis."-Type)

Tephrosia ambigua (M. A. Curtis) Chapm. Fl. Southern U. S. 96. 1865.

Cracca ambigua (M. A. Curtis) Kuntze, Rev. Gen. **1:** 174. 1891, basonym wrongly attributed to Chapm.

Tephrosia ambigua var. *gracillima* B. L. Robinson, Bot. Gaz. **28:** 201. 1899. "Dry pine barrens near Eau Gallie, Indian River [Brevard County], Florida," *A. H. Curtiss 584*, July, *5708*, 16 July 1896 (GH-Cotypes; *584*-MO, NY, US; *5708*-FLAS, KSA, MO, NY, POM, UC, US).

Cracca gracillima (Robinson) Heller, Cat. N. Amer. Pl. ed. 2. 7. 1900.

Tephrosia gracillima (Robinson) Killip, Jour. Wash. Acad. Sci. **26:** 360. 1936.

Cracca angustissima (Shuttlew.) Kuntze, sensu Vail, Bull. Torr. Cl. **22:** 32. 1895.

Prostrate to erect herbaceous perennial from a woody cylindrical pale brown tap-root; stems prostrate or erect (in depauperate specimens), up to 6 dm. long, usually branching sympodially. Stems, petioles, rachises, petiolules and axes of the inflorescences sparsely to densely strigillose or hirtellous to short-strigose or hirsutulous, or sometimes both strigillose and short-strigose or hirtellous and hirsutulous with cinereous or rarely golden hairs. Leaves erect (from prostrate stems) or ascending, 3–28 cm. long, the petioles of the principal leaves 0.3 (in occasional erect plants) to 9.5 cm. long, usually 1–4 times the length of the lowermost leaflets of a leaf; stipules of the lower leaves oblanceolate, acute, to 11.5 mm. long, 2 mm. wide, those of the upper leaves decreasing in size, lanceolate or linear, acute or acuminate, persistent; leaflets of the principal leaves 7–*13*–19, narrowly cuneate to narrowly cuneate-oblong or narrowly elliptic to elliptic, the apex obtuse or retuse, mucronate, often reflexed upward, the terminal leaflet (including the petiolule) 18–52 mm. long, (2–)5–13 mm. wide, the lateral leaflets (including the petiolules) 12–40(–45) mm. long, 2–18 mm. wide, the leaflets dull, glabrous or sparsely to moderately strigillose or hirtellous with fine gray hairs above, sparsely to moderately strigillose or hirtellous to short-strigose or hirsutulous with cinereous hairs beneath, the veins prominent, often reddish. Principal inflorescences apparently opposite the leaves, the smaller inflorescences axillary or terminal, 3.5–23 cm. long, curving upward, often exceeding the leaves, leafless, bearing flowers at 1–6 (rarely 7) nodes, the peduncle flattened, particularly below the nodes, 2-edged, up to 2(–3) mm. wide; buds 2–5 at a node, 1–3 flowering, 1 or 2 fruiting. Primary bracts narrowly oblanceolate to linear, the apex acute, the bract of the first node 3.5–8 mm. long, green, persistent; secondary bracts to 5.5 mm. long. Pedicels (3–)5–12 mm. long, ascending. Dried flowers 10–16 mm. long. Calyx 3–4.5 mm. long, strigillose or hirtellous with cinereous hairs, the upper lobes narrowly deltoid-acuminate, 1.5–2.5 mm. long, the lateral lobes lance-subulate, 1.5–3 mm. long, the lowermost lobe linear-subulate, 2.5–3.5 mm. long. Corolla white (the back of the banner yellowish, faintly veined with red) becoming pink and then carmine with age and purple upon drying; blade of the banner subquadrate to suborbicular, 10–13 mm. high, 11–15 mm. wide, finely hairy on the back, the claw 2–2.5 mm. long; wings 11–15 mm. long, auriculate, the claw 1.5–2 mm. long; keel 10–12 mm. long, with or without an auricle, the claw 2.5 mm. long. Staminal tube 8–9 mm. long, the vexillary stamen free from the tube, usually with a thickening on the upper side near the base. Ovary strigillose; ovules 10–15. Legume slightly curved downward, 3–4.5(–5) cm. long, 4–6 mm. wide, horizontal or ascending, sparsely to moderately strigillose or hirtellous with cinereous hairs; seeds 10–14, subspherical, 2–2.4 mm. in diameter, gray mottled with black or brown. Somatic chromosomes 22.

DISTRIBUTION. Well-drained, usually open, light, sandy, acid soils in pine and oak woods and barrens on the Coastal Plain from Moore and Carteret Counties, North Carolina, southward to Dade and Lee Counties,

Florida, and westward to Orleans and St. Tammany Parishes, Louisiana, United States. Map 11.

Representative specimens. Citations have, in most instances, been limited to a single collection from each county. UNITED STATES. North Carolina. Brunswick Co.: 3.5 mi. n.e. of Bolivia on Route 17, *Wood & Clement 7951* (GH, DUKE). Carteret Co.: 4.5 mi. west of Morehead City, *Wood & Clement 7025* (GH, DUKE). Hoke Co.: along Drowning Creek, *Correll 1154* (DUKE). Moore Co.: 2 mi. south of Pine Bluff, *Wiegand & Manning 1547* (GH). New Hanover Co.: Carolina Beach, *Godfrey 4704* (DUKE, GH, NY, US). Richmond Co.: 4 mi. east of Hamlet, *Wiegand & Manning 1548* (GH), 5 mi. east, *Heller 14012* (DS). Sampson Co.: 1.5 mi. from county line [Harnett?] on Highway 55, *R. Hood 154* (part) (UC). Scotland Co.: Springfield, *Godfrey 5095* (DUKE, GH).

South Carolina. Aiken Co.: 10 mi. north of Aiken, *Wood & Clement 7589* (GH). Beaufort Co.: Beaufort, *Wood & Clement 7107* (GH). Charleston Co.: Route 17, 14.8 mi. east of the Edisto River, *Wood & Clement 7089* (GH). Chesterfield Co.: 2 mi. south of McBee, *Wood & Clement 7601* (GH). Darlington Co.: Hartsville, *Norton*, 1920 (US). Florence Co.: 5 mi. north of Coward, *Wiegand & Manning 1550* (GH). Georgetown Co.: 15.25 mi. north of Georgetown on Route 17, *Wood & Clement 7075* (GH). Horry Co.: 15.8 mi. north of Myrtle Beach on Route 17, *Wood & Clement 7071* (GH). Kershaw Co.: 3 mi. n.e. of Camden, *Wood & Clement 7598* (GH). Lexington Co.: 14 mi. south of Columbia, *Godfrey & Tryon 1311* (CAS, DUKE, GH, MO, NY, US).

Georgia. Appling Co.: 3 mi. north of Baxley, *Wood & Clement 7560* (GH). Decatur Co.: Flint River at West Bainbridge, *Harper 1238* (GH, NY, US). Dougherty Co.: near Albany, *McKellar*, 1937 (GA). Baker Co.: Flint River at Ichanochaway Creek, *Duncan 6647* (GA). Echols Co.: Mayday, *McKellar*, 1937 (GA). Emanuel Co.: 3 mi. north of Oak Park, *Wood & Clement 7575* (GH). Lanier Co.: Lakeland, *McKellar*, 1937 (GA). Liberty Co.: 4 mi. s.w. of Hinesville, *Wiegand & Manning 1522* (GH). McIntosh Co.: 5 mi. north of Darien, *Wood & Clement 7117* (GH). Toombs Co.: 7 mi. south of Lyons, *Wood & Clement 7563* (GH). Ware Co.: 2 mi. n.e. of Waycross, *Erlanson 294* (UC).

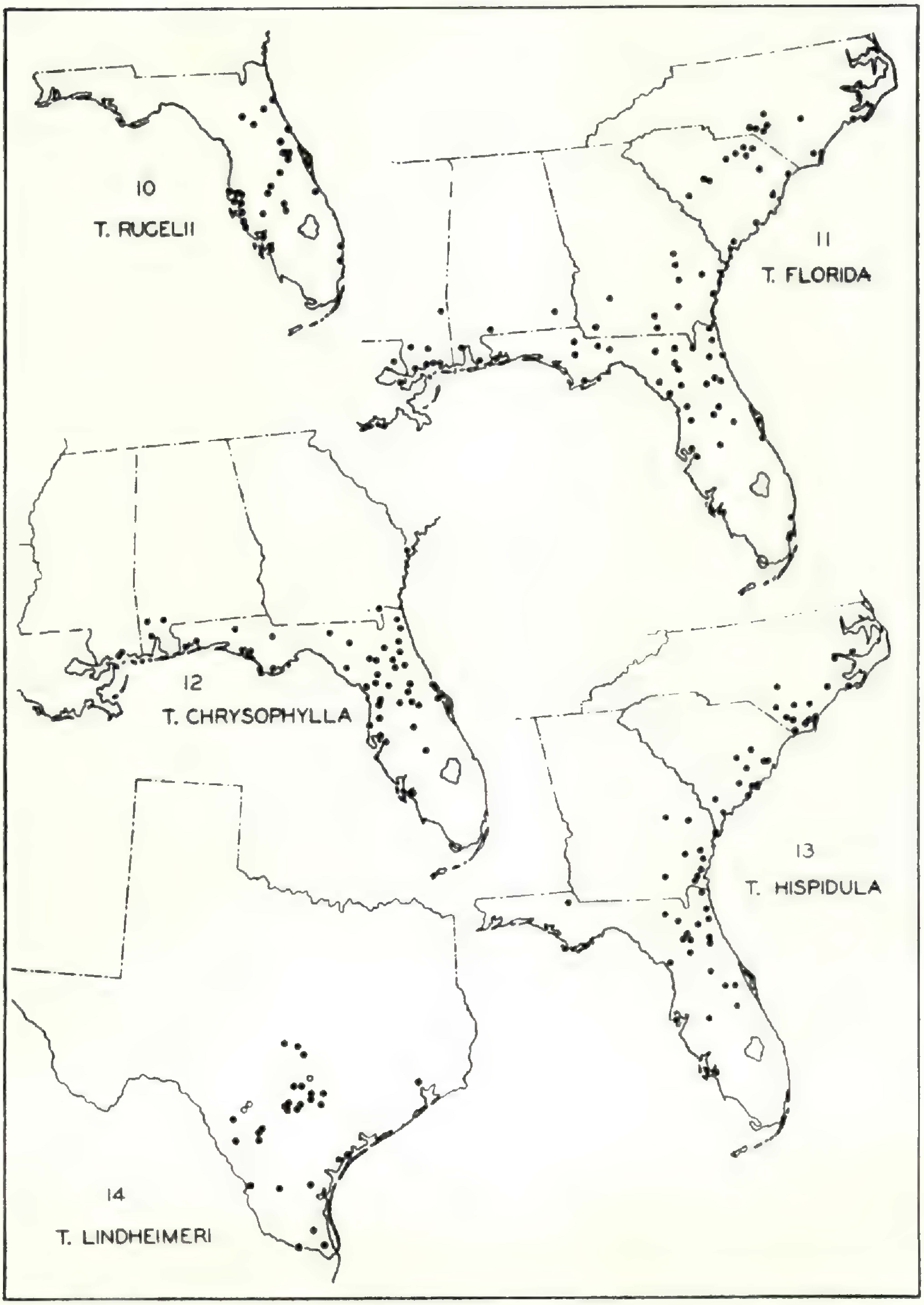
Florida. Alachua Co.: High Springs, *Wood & Clement 7539, 7540* (GH). Baker Co.: McClenny, *Futch*, 1936 (FLAS). Bay Co.: Lynn Haven, *Billington 19* (US). Brevard Co.: Eau Gallie, *Curtiss 584* (GH, MO, NY, US), *5708* (FLAS, GH, KCS, MO, NY, POM, UC, US), *Wood & Clement 7202* (GH, DUKE), *G. Bates*, 1889 (F). Broward Co.: between Ft. Lauderdale and Miami, *Small, Carter & Small*, 1911 (NY). Calhoun Co.: Blounttown, *Erlanson 226* (US). Clay Co.: Green Cove Springs, *Wood & Clement 7153* (GH). Citrus Co.: 10 mi. south of Dunellon, *Wood & Clement 7527* (GH). Columbia Co.: 5 mi. north of High Springs, *Wood & Clement 7546* (GH). Dade Co.: Buena Vista, *Moldenke 776a* (DUKE, NY, PENN); Miami, *O'Neill 8170* (CAS, F, UC, US); Ross-Costello Hammock, *Small, Mosier & Small 6568* (DUKE, FLAS, NY,

PENN, WVA). Duval Co.: near Jacksonville, *Curtiss 583* (GH, MO, NY, PENN, PH, TENN, UC, US), *4228* (DS, POM, NY, US). Escambia Co.: Pensacola, *McFarlane*, 1905 (PENN). Franklin Co.: Apalachicola, *Chapman* (MO), *Sausman* (PENN). Gadsden Co.: Quincy, *H. Foster*, 1936 (FLAS). Hernando Co.: 15 mi. north of Brooksville, *Crevasse*, 1940 (FLAS). Hillsborough Co.: Riverview, *Wood & Clement 7513* (GH). Jackson Co.: 4 mi. east of Marianna, *Erlanson 229* (UC, US), *230* (US). Lake Co.: Eustis, *Nash 819, 1555* (GH, MO, NY, UC, US), *Hitchcock*, 1894 (F, FLAS, KSC, MO). Lee Co.: north of Estero, *Wood & Clement 7504* (GH). Leon Co.: Tallahassee, *Rugel*, 1843 (part) (MO). Levy Co.: Rosewood, *Garber*, 1876 (US). Marion Co.: 1 mi. east of Orange Springs, *West & Arnold*, 1941 (FLAS). Madison Co.: *Hitchcock*, 1898 (F). Nassau Co.: just north of the Nassau River on U. S. Route 17, *Wood & Clement 7144* (GH). Orange Co.: Lake Brantley, *Lewton*, 1894 (F, NY, PH). Polk Co.: Bartow, *Buswell*, 1919 (MIAMI). Putnam Co.: Crescent City, *Martin*, 1880 (MO). St. John Co.: St. Augustine, *M. Reynolds*, 1877 (NY). Suwanee Co.: 5 mi. west of Live Oak, *Wiegand & Manning 1553* (GH). Volusia Co.: DeLand, *Hulst*, 1891 (NY).

Alabama. Baldwin Co.: 8 mi. north of Fairhope, *Erlanson 205* (F). Dale Co.: *Biltmore Herb. 4682b* (NY). Escambia Co.: Atmore, *Blanton 195* (part) (GH). Mobile Co.: Spring Hill, *Bush 92* (NY), *Drushel*, 1915 (MO). Mississippi. Hancock Co.: Bay St. Louis, *Langlois*, 1883 (DS, NY). Harrison Co.: Biloxi, *Tracy & Lloyd 156* (GH, NY). Jackson Co.: Ocean Springs, *Pollard 1011* (MO, NY, US). Pearl River Co.: Poplarville, *Erlanson 170* (GH, US). Stone Co.: 1 mi. north of Ramsey Hotel, *Brenner*, 1940 (MO). Waynesboro, *Pollard 1255* (MO, NY, US). Louisiana. St. Tammany Parish: Abita Springs, *Pennell 4136* (NY, PENN, PH); Covington, *Bro. Arsène 1164, 11071, 11466, 11474, 11580, 11860* (US). Orleans Parish: New Orleans, *Drummond 84* (GH), *Ingalls* (NY).

Tephrosia florida, as it occurs throughout much of its range, is a plant with prostrate stems and erect or ascending leaves with very long petioles, some of which may be as much as four times as long as the lowermost leaflets of a leaf. The few-flowered inflorescences are usually produced sympodially and curve upward. However, an erect, apparently depauperate form, with very short petioles and ascending, often axillary inflorescences, occurs sporadically. It may, nevertheless, be recognized as this species by the size and shape of the calyx, the strongly flattened two-edged axes of the inflorescences, and the hirtellous legumes.

Very young or depauperate forms of *Tephrosia florida* have been mistaken for *T. hispidula*, especially in the western part of the range of the former species, but may be separated, even in



Distributions of some barbistyled species of TEPHROSIA in the United States. MAP 14. Dots, T. LINDHEIMERI; circles, Texas collections of T. POTOSINA; see also MAP 18, page 323.

flower, by the very short hairs only 0.2–0.4 mm. long on both ovary and pod.

The very narrow-leaved plant known as *Tephrosia ambigua* var. *gracillima* B. L. Robinson appears to be only a local variation without clear morphological or geographical limits. I have seen it at the type-locality at Eau Gallie, Brevard County, Florida, (where the typical form has also been collected) and, with slightly broader leaves, near Estero, Lee County, on the other side of the peninsula.

The four pubescence-forms encountered in *Tephrosia onobrychoides* and *T. hispidula* occur sporadically nearly throughout the range of *T. florida* without showing definite geographical segregation. Three of the four types occur in the most northeasterly colony known (Carteret Co., N. C.) and the same three are found in the neighborhood of Miami, Florida, at the extreme south of the range of the species. I have, however, seen no herbarium specimens from Alabama and Louisiana (where I have no field-acquaintance with the species) with spreading pubescence, although plants with the leaflets either glabrous or pubescent above appear to occur together throughout the area. The absence of such plants in Alabama and Louisiana may well be more apparent than real.

Galega villosa Michx. of "Carolina ad Florida" usually has been interpreted as either *Tephrosia spicata* (Walt.) T. & G. or *T. chrysophylla* Pursh. Michaux' description is insufficiently definite to determine which of the several species of the southeastern United States he had. However, a photograph in the Gray Herbarium of the type-specimen in the Paris Museum clearly shows *Galega villosa* Michx. to be the present species. This name, *Galega villosa* Michx. (1803), is a later homonym of *G. villosa* L. (1753). In spite of this Persoon made combinations under his genus *Tephrosia* (1807) for both the Michaux and Linnaean names. Under these circumstances the combination *Tephrosia villosa* (L.) Pers., based on the valid name, should stand. This combination is currently used for an Asiatic plant which has been designated as the type-species of the conserved genus *Tephrosia*.

Dietrich in 1817 described *Galega florida*, apparently as a substitute for *G. villosa* Michx. His Latin description is identical

with that of Persoon's *T. villosa* which was abridged from Michaux' original brief description. Dietrich added a German translation of the Latin. There can be no doubt that *Galega florida* F. G. Dietr., as described, is synonymous with *G. villosa* Michx. The original description is as follows:

2. *Galega florida* Diet. Amerikanische Geisraute.

Tephrosia (villosa) prostrata villosissima, foliolis cuneato-obovalibus, spic. suboppositifoliis paucifloris, legum. oblongis. Mich. amer. 2. p. 68.

Der Stengel is auf der Erde hingestreckt und mit weichen Haaren dicht bekleidet; er trägt gefiederte Blätter, deren Blättchen keilförmig-oval sind, und wenigblümige Aehren, die den Blättern gegenüberstehen. Die Hülse ist länglich.

Vaterland: Nordamerika, Carolina und Florida.

Dietrich here properly supplied a new name for *G. villosa* Michx., a later homonym of *G. villosa* L., although he did not really indicate that this was his reason for doing so. He did, however, know of the earlier *G. villosa* L., for it is listed in his Vollst. Lexik. Gaertn. und Bot. **4:** 260. 1804, to which the above work is an addition. Later, however, in 1838 (in his Neuer Nachtr. Vollst. Lexik. Gaertn. und Bot. **8:** 553), after having accepted *Tephrosia* Pers., he placed his *G. florida* in the synonymy of *Tephrosia villosa* (L.) Pers., and placed *G. villosa* Michx. in that of *T. prostrata* Nutt., along with *T. chrysophylla* Pursh. From this later split it may be argued that Dietrich did not know what he was doing and that he did not intend to substitute the name *G. florida* for *G. villosa* Michx. However, since he obviously knew of the previous *G. villosa* L. and since he actually did supply a new name for *G. villosa* Michx., a later homonym, *Galega florida* F. G. Dietr. seems to be a perfectly valid name which it is necessary to use. Most unfortunately this old name must replace the well-known *Tephrosia ambigua* (M. A. Curtis) Chapm., but there appears to be no other alternative, now that *Galega villosa* Michx. is known to be this species.

19. **Tephrosia chrysophylla** Pursh

Tephrosia chrysophylla Pursh, Fl. Amer. Sept. **2:** 489. 1814. "Georgia, *Enslen.*"

Galega chrysophylla (Pursh) Steud. Nom. ed. 1. 350. 1821.

Cracca chrysophylla (Pursh) Kuntze, Rev. Gen. **1:** 174. 1891.

Tephrosia prostrata Nutt. Gen. N. Amer. Pl. **2:** 210. 1818. "Common around Savannah in Georgia in dry and sandy woods" (PH-Type).

Cracca chrysophylla Chapmanni Vail, Bull. Torr. Cl. **22:** 34. 1895. "St. Joseph's, Florida," [Pasco County], *Chapman*, (NY-Type; GH).

Tephrosia chrysophylla var. *Chapmanni* (Vail) B. L. Robinson, Bot. Gaz. **28:** 198. 1899.

Cracca Chapmanni (Vail) Small, Fl. Southeastern U. S. 612, 1331. 1903.

Cracca Carpenteri Rydb. N. Amer. Fl. **24:** 172. 1923. "Pine woods," Pensacola, Escambia County, Florida, *Dr. Carpenter 44*, June 1838 (NY-Type).

Tephrosia Carpenteri (Rydb.) Killip, Jour. Wash. Acad. Sci. **26:** 360. 1936, as *Carpinteri*.

Completely prostrate perennial herb from a woody crown and ligneous, cylindrical tap-root; stems one to several, branching sympodially, up to 1 m. long. Stems, petioles, rachises, petiolules and axes of the inflorescences strigillose or both hirtellous and hirsutulous or sparsely hirsute with rusty or cinereous hairs. Leaves prostrate, 1.2–6.5 cm. long, nearly sessile or with petioles up to 5 (rarely 7 mm.) long; stipules often persistent, lanceolate or linear-lanceolate, 2–6 mm. long; leaflets (3–)5–7(–9 or very rarely 11), cuneate, obovate-cuneate, or narrowly so, or occasionally obovate to nearly orbicular, mucronate, the terminal leaflet 8–30(–35) mm. long, 6–20 mm. wide, often conspicuously larger than the lateral, the lateral leaflets 7–28 mm. long, 4–15 mm. wide, somewhat coriaceous, shining when fresh, green, glabrous (or rarely finely hirtellous with golden-brown hairs) above, moderately to densely strigillose and short-strigose beneath with cinereous to golden-brown hairs, usually appearing silky. Inflorescences opposite the leaves (or terminal late in the season), 1.5–19 cm. long, exceeding the leaves, prostrate, slightly angled to somewhat flattened, leafless, bearing flowers at 1–8 nodes; buds 2–3 at a node, 1 or 2 of these flowering. Primary bracts lanceolate to subulate-lanceolate or occasionally ovate and obtuse, 2–6 mm. long, persistent. Pedicels 3–10 mm. long, ascending. Dried flowers 10–15 mm. long. Calyx hirtellous or strigillose or both hirtellous and hirsutulous with whitish or (on the lobes) bronzy hairs, 5–6 mm. long, the upper lobes lanceolate, acute or acuminate, 2.5–4 mm. long. Corolla white (the back of the banner pinkish or faintly lined with red), becoming pink and then carmine in age and purple upon drying; blade of the banner subquadrate or orbicular, 11–13 mm. high, 12–14 mm. broad, silky on the back, the claw 2.5 mm. long; wings 12–14 mm. long, auricled, the claw 1.5–2 mm. long; keel 9–13 mm. long, the claw 2–2.5 mm. long. Staminal tube 10–11 mm. long, the vexillary stamen completely free, without a distinct thickening on the upper side near the base. Ovary densely strigillose; ovules 9–13. Legume nearly straight, borne parallel to the surface of the ground, (2.2–)3.2–5.5 cm. long, 4–5.5 mm. wide, strigillose or hirtellous with antrorsely directed hairs; seeds 6–13, subspherical, 2.4–3 mm. in diameter, brown mottled with black. Somatic chromosomes 22. Flowering collections from mid-May through September.

DISTRIBUTION. Prostrate on well-drained, sandy soils usually in full

sun in open oak and pine woods, Chatham (where not recently collected) and Charlton Counties, Georgia, south to Highlands and Lee Counties, Florida, and west to Harrison County, Mississippi, United States. Map 12.

Specimens examined. UNITED STATES. Georgia. *Dr. Boykin* (NY); inter frutices in arenosis, *Beyrich 161* (MO, NY). Chatham Co.: Savannah, *John Forbes* (NY), *Nuttall* (PH). Charlton Co.: between Spanish Creek and Traders Hill, *Harper 1497* (GH, NY, US). Florida. *Buckley* (GH, MO, NY); *Chapman* (GH, MO, NY, US); *Torrey & Gray* (GH); *Nash 553, 753* (NY). Alachua Co.: *Hitchcock*, 1898 (MO); near Gainesville, *Murrill*, 1939 (DUKE), *West 5* (FLAS); High Springs, *Wood & Clement 7534* (GH). Bay Co.: Lynn Haven, *Billington*, 1921 (US). Bradford Co.: 10 mi. south of Starke, *Dennison & Arnold*, 1946 (FLAS). Brevard Co.: Indian River City, *Wood & Clement 7196* (GH). Citrus Co.: 3 mi. s.s.w. of Inverness, *Wood & Clement 7525a* (GH); 11 mi. n.e. of Red Level, *West & Arnold*, 1941 (FLAS). Clay Co.: Green Cove Springs, *Wood & Clement 7151* (GH); Gold Head Branch State Park, *West*, 1939 (FLAS). Dixie Co.: 2 mi. south of Shamrock, *Erlanson 243* (US); 10 mi. west of Shamrock, *Pasture Survey*, 1937 (FLAS). Duval Co.: South Arlington, *Lighthipe 608* (NY); *Pieters 53* (GH), *44* (US); *Curtiss*, 1876 (US); Jacksonville, *Curtiss 582* (CAS, GH, MO, NY, PH, UC, US), *2825* (US), *4229* (DS, NY, UC, US), *4824* (GH, NY, UC, US), *Fredholm 225* (POM); 2 mi. south of Nassau Co. line on U. S. Route 17, *Wood & Clement 7146* (DUKE). Escambia Co.: Pensacola, *Carpenter 44* (NY). Franklin Co.: Apalachicola, *Chapman* (MO). Hernando Co.: Highway 41 near Citrus Co. boundary, *Wood & Clement 7524* (GH); hillside near Chisegut Hill Bird Sanctuary, 3 mi. south of Citrus Co. line on route 41, *Wood & Clement 7521* (GH). Highlands Co.: Avon Park, *Buswell*, 1936 (MIAMI); Sebring, *Small & West*, 1934 (FLAS); Lake Jackson, Sebring, *McFarlin 8114* (NY). Hillsborough Co.: 1 mi. south of Riverview, *Wood & Clement 7514* (GH); Tampa, *Henshall* (F), *Ferguson*, 1898 (MO), *Garber*, 1877 (GH, PH, US), 1876 (NY, US), *Britton & Wilson 12* (NY); Long Island, Tampa Bay, *Rugel*, 1845 (NY). Holmers Co.: Ponce de Leon, *Knight*, 1944 (FLAS). Lake Co.: Astor Park, *Wood & Clement 7176* (GH); Eustis, *Gandoger*, 1900 (MO), *Nash 811* (GH, MO, NY, UC, US), *1964* (NY, US), *Hitchcock*, 1894 (F, FLAS, KSC, MO). Lee Co.: Myers, *Hitchcock 81* (GH, MO, NY, US). Levy Co.: 2 mi. south of Lebanon Station, *Pasture Survey*, 1937 (FLAS). Liberty Co.: Bristol, *Chapman* (MO, US); just north of Bristol, *West & Arnold*, 1940 (FLAS); Roy, *Wiegand & Manning 1554* (GH). Madison Co.: *Hitchcock*, 1898 (F, MO). Marion Co.: 3 mi. south of Orange Springs, *West & Arnold*, 1942 (FLAS); 16 mi. south of Ocala, *Erlanson 249* (GH, US); 20 mi. south of Gainesville, *Erlanson 244* (GH, UC-part). Orange Co.: *Buswell*, 1932 (MIAMI); *Fredholm 5364* (GH); Lake Brantley, *Lewton*, 1894 (NY); Clarcona, *Pieters 53* (US), *Meislahn 141* (US); south of Wekiva Springs, *Moldenke 5359* (NY); west of Bithlo on Route 50, *Wood & Clement 7192* (GH); Orlando, *Davis*, 1934 (FLAS); just south of Tangerine, *Wood & Clement*

7189 (GH). Pasco Co.: St. Joseph, *Chapman* (GH, NY); 15 mi. s.s.w. of Brooksville (Hernando Co.), *Wood & Clement 7520* (GH). Polk Co.: *Schallert 16503* (NY, US); Lake Alfred, *Bottimer 497* (US). Putnam Co.: Johnson, *Barnhart 1275* (NY); 3 mi. south of Clay Co. line on U. S. Route 17, *Wood & Clement 7169* (GH); Welaka, *Laessle*, 1940 (FLAS). Santa Rosa Co.: Choctawahatchee National Forest, east of Milton, *Erlanson 216* (US). Suwanee Co.: 5 mi. west of O'Brien, *Arnold & West*, 1946 (FLAS). Volusia Co.: 6 mi. south of New Smyrna, *Butts & Ames 528* (GH).

Alabama. Baldwin Co.: Tensaw, *Tracy 8014* (GH, NY). Mobile Co.: Mobile?, *Mohr* (F); Mobile, *Baker*, 1897 (KSC, MO, NY); 16 mi. north of Mobile, *Erlanson 183* (US); 2 mi. north of Citronella, *Erlanson 202* (US); Spring Hill, *Mohr*, 1897 (US), *Bush 298* (NY, US). Mississippi. Harrison Co.: Beauvoir, *Tracy 4911* (GH, MO, NY, US); Bond's Point, *Tracy 4437* (US); west of bay, Biloxi, *Pennell W4389* (PENN); 1 mi. east of Mississippi City, *Pennell 4354* (NY, PENN).

Tephrosia chrysophylla is a characteristic species of open, well-drained, sandy soils of Florida. The completely prostrate habit, combined with the few, usually cuneate or obovate leaflets and the very short petioles, is distinctive.

Plants smaller than normal in varying degrees have received specific names for which there seems no justification. Those with leaflets 1–1.5 cm. long are *Cracca Carpenteri* Rydb., but such plants occur in peninsular Florida with the ordinary type, the leaflets of which are 0.8–3 cm. long. *Cracca Chapmanni* (Vail) Small is known only from two specimens collected by Chapman. These plants are reduced in size in all their parts, but are particularly conspicuous in their small leaflets, 5–15 mm. long, and their pods, 2 cm. long and 3–4 mm. wide. Since these specimens were collected well within the range of *T. chrysophylla* and since they differ only in size, they should be regarded, in the absence of other evidence, merely as a form of the species. Chapman (as many another botanist of his time and later) seems to have taken a particular interest in collecting aberrant forms and many peculiar and fragmentary plants are represented in his collections.

The three collections cited from Highlands County, Florida, need further investigation. These are atypical in that the upper surfaces of the leaflets are hirtellous, while the leaflet-number varies from five to eleven. The leaflets are somewhat smaller and more uniform in size than is usual in *Tephrosia chrysophylla* and the plants themselves are slightly reminiscent of *T.*

Rugelii, although the habit is evidently prostrate. Coming from the southern edge of the range of *T. chrysophylla* but within the area of *T. Rugelii* as they do, these specimens suggest the interesting possibility of hybridization of these two species.

19a. **Tephrosia chrysophylla × Tephrosia florida**

Cracca intermedia Small, Bull. Torr. Cl. **21:** 303. 1894. "Near Jacksonville," Duval County, Florida, *A. H. Curtiss 4231*, 31 May, 11 July 1893 (NY-Type; DS, UC, US).

Cracca Smallii Vail, Bull. Torr. Cl. **22:** 33. 1895. Illegitimate; substituted for *C. intermedia* because of *Tephrosia intermedia* Graham, 1828, a name which had never been transferred to *Cracca*.

Tephrosia Smallii Robinson, Bot. Gaz. **28:** 198. 1899, as comb. nov., but a new name based on *Cracca intermedia* Small, not *Tephrosia intermedia* Graham, 1828.

Cracca floridana Vail, Bull. Torr. Cl. **22:** 35. 1895. "Central Florida," *G. V. Nash 494½, 1198, 1263, 1334, 1552, 1615,* (probably all collected in the vicinity of Eustis, Lake County, Florida); *1552*, vicinity of Eustis, 1–15 August 1894 (NY-Cotypes; *1552*-GH, MO, UC, US).

Intermediate between *Tephrosia chrysophylla* and *T. florida*. Perennial from a woody crown and brown cylindrical woody tap-root; stems prostrate, branching sympodially, spreading, leafy from the base, generally terete. Stems, petioles, rachises, petiolules and axes of the inflorescences hirtellous, strigillose or hirtellous and hirsutulous with brown or cinereous hairs. Leaves usually ascending, but sometimes prostrate, or rarely erect, 5–10 cm. long, the petioles of the principal leaves 5–19 mm. long, (1/5–) 1/3–7/9 of the length of the lowermost leaflets (including petiolules) of a leaf, some or all more than 1/3 the length of the lowermost leaflets; stipules lanceolate to linear, acute or acuminate, 2–8 mm. long, up to 2 mm. wide, persistent; leaflets of the principal leaves 7–11(–13), averaging 9, cuneate to oblong-obovate to narrowly elliptic, the apex rounded to retuse, mucronate, the terminal leaflet 16–32 mm. long, 7–19 mm. wide, the lateral leaflets 12–28 mm. long, 5–14 mm. wide, the lowermost usually smallest, the leaflets of living plants dull, with the texture of *T. florida*, lacking the luster of *T. chrysophylla*, glabrous (or very rarely hirtellous) above, moderately strigillose or strigillose and short-strigose or rarely hirtellous beneath, not sericeous. Inflorescences opposite the leaves, generally exceeding them, 6–22 cm. long, prostrate or occasionally slightly assurgent, leafless, bearing flowers at 1–6 nodes, the peduncle strongly flattened and 2-edged as in *T. florida*, especially below the first node; buds 2 or 3 at a node, 1 or 2 of these flowering. Primary bracts persistent, that of the first node 2–5 mm. long, decreasing in size at the upper nodes. Dried flowers 10–15 mm. long. Calyx 3.5–4 mm. long, intermediate between or resembling either parent, more often *T. florida*. Corolla white, as in the parents; blade of the banner 13 mm. high, 11 mm. wide; wings about 13

mm. long with a blunt auricle on the upper side. Legume straight or slightly curved downward, hirtellous or strigillose with cinereous hairs, few of the ovules developing, the seeds 2–5; mature seeds not seen.

DISTRIBUTION. Open, well-drained sandy soils occupied by both presumed parents in Georgia, Florida and Alabama, United States.

SPECIMENS EXAMINED. UNITED STATES. GEORGIA. Without locality, *Dr. Boykin* (NY). FLORIDA. Without locality, *Chapman* (GH, MO, NY, OKL); *Nash 1334* (NY). Duval Co.: near Jacksonville, *Curtiss*, 31 May 1893 (MO), *Curtiss 4231*, 31 May, 11 July 1893 (DS, NY, UC, US); oak scrubs in dry pine barrens, *Curtiss 4825*, 31 July 1894 (FLAS, GH, MO, NY, UC). Franklin Co.: dry sand ridges, Apalachicola, *Saurman*, 1867 (F, PENN). Hernando Co.: white sand in long-leaf pine and *Quercus laevis* woods on hill on Highway 41 near the Citrus Co. boundary, *Wood & Clement 7523*, 9 Aug. 1947 (FLAS, GH). Hillsborough Co.: white sand in openings in *Quercus virginiana* woods, 1 mi. south of Riverview, *Wood & Clement 7515*, 8 Aug. 1947 (GH). Lake Co.: vicinity of Eustis, *Nash 1552*, 1–15 Aug. 1894 (GH, MO, UC, US); probably in the vicinity of Eustis, *Nash 494½, 1198, 1263, 1615* (NY); vicinity of Eustis, *Hitchcock*, June–July 1894 (F). Marion Co.: in oak-scrub palmetto-flats, *Erlanson 244* (part), 28 May 1935 (UC). ALABAMA. Mobile Co.: Spring Hill, *Bush 296*, 1 Aug. 1897 (NY-part, US), *92*, 3 Aug. 1897 (US); Spring Hill, *Mohr*, 18 May 1896, 1897 (US); under scrub-oak and long-leaf pine, 18 mi. north of Mobile, *Erlanson 190*, 24 May 1935 (US).

Although Small pointed out in the description of *Cracca intermedia* that his "species" was intermediate between *C. ambigua* (*T. florida*) and *C. chrysophylla* (*T. chrysophylla*), the possibility of a hybrid origin of this plant does not appear to have been suggested. In the summer of 1947, however, plants strikingly intermediate between *Tephrosia florida* and *T. chrysophylla* and very like the type-collection of *Cracca intermedia* were found in two localities in peninsular Florida growing with the presumed parents. In both instances, only these two species of *Tephrosia* were present, along with relatively few plants of the putative hybrid. The intermediate nature of these plants and other presumed hybrids is indicated in the accompanying table.

Since "*Cracca intermedia*" occurs with both *T. chrysophylla* and *T. florida* in the absence of other species, since it occurs sporadically and only within the overlapping ranges of both species, and since it is morphologically intermediate between the two species, it seems safe to postulate the hybrid-character of these plants even in the absence of experimental evidence.

Cracca floridana Vail supposedly differed from *C. intermedia* in

T. florida	*C. intermedia*	*T. chrysophylla*
Stems prostrate, leaves erect.	Stems prostrate, leaves usually ascending at an angle, occasionally prostrate or erect.	Entire plant completely prostrate.
Leaflets 7–*13*–19, thin, dull.	Leaflets 7–*9*–11(–13), thin, dull.	Leaflets 3–*7*–9, somewhat coriaceous, shining.
Leaflets narrowly cuneate to narrowly oblong-cuneate, narrowly elliptic or linear-elliptic.	Leaflets cuneate to oblong-obovate or narrowly elliptic.	Leaflets cuneate, obovate-cuneate, or oblong-obovate, occasionally obovate to nearly orbicular.
Terminal leaflet 18–52 mm. long, 5–13 mm. wide; lateral leaflets 12–45 mm. long, 2–18 mm. wide.	Terminal leaflet 16–32 mm. long, 12–28 mm. wide; lateral leaflets 12–28 mm. long, 5–14 mm. wide.	Terminal leaflet 8–30 mm. long, 6–20 mm. wide; lateral leaflets 7–28 mm. long, 4–15 mm. wide.
Petioles 1–4 times the length of the lowermost leaflets of the leaves.	Petioles usually 1/3–7/9 of the length of the lowermost leaflets.	Petioles usually very short, less than 1/3 the length of the lowermost leaflets.
Axes of inflorescences strongly flattened, 2-edged, assurgent.	Axes of inflorescences flattened, 2-edged, prostrate or somewhat assurgent.	Axes of inflorescences sometimes slightly flattened, always prostrate.
Calyx 3–4.5 mm. long.	Calyx 3.5–4 mm. long, intermediate in shape or resembling *T. florida*.	Calyx 5–6 mm. long.

its assurgent habit, but Robinson (1899, p. 193) pointed out that the evidence is all to the contrary and concluded that *C. intermedia* and *C. floridana* represent variations of the same entity. In this he seems thoroughly justified. Miss Vail may have been misled by a Louisiana collection, "New Orleans, Dr. Ingalls," (NY), cited by her as one of the cotypes. This plant is the erect form of *Tephrosia florida* and not the plant under discussion here. If *Cracca floridana* is considered to be synonymous with *Cracca intermedia*, whoever desires to apply a "specific" name to these plants must make the proper combination under *Tephrosia* with *Cracca floridana* Vail as the basonym. *Nash 1552* would be the appropriate Type; the other cotypes are apparently represented only at NY. There would appear, however, to be little justification for applying a specific name to a hybrid of this kind.

It seems likely that the isolating mechanism between *Tephrosia chrysophylla* and *T. florida* is at least partially ecological.

Ordinarily *T. chrysophylla* seems to tolerate considerably drier, hotter and more open situations (particularly in oak-barrens where it usually occurs prostrate in openings on the white sand) than does *T. florida.* The latter species occurs more often in somewhat grassier and more shaded situations, which are probably also slightly moister. Occasionally, however, the two occur together, as at the localities cited in Hillsborough and Hernando Counties, Florida, and it is in areas such as these that the putative hybrids are found.

A second hybrid of *Tephrosia chrysophylla* is apparently represented by collections from Astor Park, Lake County, Florida. Here perfectly typical *T. chrysophylla* (*Wood & Clement 7176*) grew on the open white sand of a road embankment and *T. spicata* (*Wood & Clement 7178*) a few feet away at the edge of brush in a live-oak and saw-palmetto woods. Various scattered plants collected along the roadway combined characteristics of both of these species. One of these (*7181a*) had prostrate leaves with 7–9 (primarily 9) leaflets of intermediate shape with the pubescence of *T. chrysophylla* and the ascending inflorescences of *T. spicata* (those of *T. chrysophylla* are always borne parallel to the surface of the ground). Another plant (*7180b*) resembled *T. chrysophylla* still more, but bore 7–9 leaflets and inflorescences which were either prostrate or ascending at the tip. Five plants were found with prostrate leaves, bearing 5–11 leaflets (mostly 7–9) of intermediate shape, with the upper surfaces of the leaflets hairy and the inflorescences strongly ascending. All of these specimens seem to indicate various combinations of the characters of both *T. chrysophylla* and *T. spicata* and suggest repeated hybridization at this locality. Here again it may be noted that these two species do not ordinarily occur in the same habitat and that this may be an example of the breakdown of an ecological barrier through the agency of man.

20. **Tephrosia tepicana** Standl.

Cracca tepicana Standl. Contr. U. S. Nat. Herb. **20:** 217. 1919. Tepic, Nayarit, Mexico, *Edward Palmer*, 5 Jan.–6 Feb. 1892 (US 305316-Type).
Tephrosia tepicana Standl. Field Mus. Publ. Bot. **4:** 214. 1929.

Decumbent herbaceous or suffrutescent perennial; stems slender, ca. 2 mm. in diameter, flexuous, nearly terete near the base, often acutely angled above and almost triangular. Stems, petioles, rachises and petiolules thinly hirsutulous, hirtellous or strigillose with whitish hairs, or

nearly glabrous. Leaves apparently either prostrate or ascending, 6–16 cm. long, the petioles 1–35 mm. long, shorter than the leaflets of the lowermost pair, the rachis (0.7–)2–10 cm. long; stipules subulate or linear, long-acuminate, 3–13 mm. long, less than 1 mm. wide, brown, persistent, ascending; leaflets of the principal leaves 5–11, elliptic-oblong, elliptic or oval-oblong to lanceolate or elliptic-lanceolate, the upper leaflets largest, 30–59 mm. long, 13–30 mm. wide, the lowermost pair smallest, (12–)20–55 mm. long, (8–)12–23 mm. wide, the leaflets rounded or subcordate at the base, the apex retuse, obtuse or acute, mucronate; leaflets thin but rigid, with the midrib impressed, green, dull or somewhat shining, thinly strigillose to hirtellous and glabrate above, thinly hirtellous to strigillose below with whitish hairs 0.2–0.6 mm. long, or short-strigose to hirsutulous along the midrib, the margins undulate, sometimes subcrenate, ciliate with cinereous hairs ca. 1 mm. long, these often deciduous; petiolules 1.5–2.5 mm. long. Inflorescences terminal or axillary, probably sometimes appearing to be opposite the leaves, leafless, ascending, slender, (2–)4–22 cm. long, the peduncle (1.5–)2.5–9 cm. long, the axis of the inflorescence thinly strigillose to nearly glabrous, usually flattened and 2-edged, few-flowered, the (3–)5–18 flowering nodes often crowded distally; buds 3–5 at a node, 2–3 of these flowering. Primary bracts linear-subulate, 3–9 mm. long, persistent, brown; secondary bracts linear-setaceous, 1–4 mm. long. Pedicels 4–7 mm. long, slender, ascending. Dried flowers ca. (12–) 15 mm. long. Calyx 4.5–5 mm. long, strigillose to hirtellous, the lobes deltoid or deltoid-ovate, abruptly short-acuminate, the upper lobes 1.5–2 mm. long, the lateral 2 or 3 mm. long, the lowermost ca. 2 mm. long. Flower-color unknown, brown or purplish in dried specimens; blade of the banner apparently oval, ca. 11 mm. high, 16 mm. broad, strigillose on the back with fine silky golden hairs, the claw ca. 3 mm. long; wings 13–15 mm. long, 4–5 mm. wide, slightly auricled, the claw 2 mm. long; keel 14–15 mm. long, 6 mm. deep, rounded at the apex, slightly auriculate at the base, the claw ca. 3 mm. long. Staminal tube 9–10 mm. long, the vexillary stamen lightly coherent with the staminal tube or free, somewhat thickened on the upper side near the base. Ovary densely strigillose, silky. Nearly mature pod almost straight, with a slightly down-curved beak, ca. 6 cm. long, 6 mm. wide, hirtellous to strigillose with cinereous hairs 0.2–0.4 mm. long; seeds 10 or 11, the mature seeds unknown. Flowering collections January to February.

Distribution. Southern Sinaloa and Nayarit, Mexico. Map 24.

Specimens examined. MEXICO. Sinaloa: Vicinity of Balboa, Municipalidad San Ignacio, *J. G. Ortega 1209* (MEXU); Balboa, *Ortega 5104*, Jan. 1925 (US); Mazatlán, *Ortega 5081*, Jan. 1923 (US). Nayarit: Tepic, *Palmer*, 5 Jan.–6 Feb. 1892 (US).

Tephrosia tepicana is easily recognized by habit, leaflet-number and -shape, and calyx. The vexillary stamen appears to be free from the staminal tube, but the present paucity of flowering

material leaves this in doubt. This little-collected species appears to be related to *Tephrosia madrensis* which is known from a single collection, presumably from the Sierra Madre of this same region.

21. **Tephrosia madrensis** Seem.

Tephrosia madrensis Seem. Bot. Voy. Herald 280. pl. 61. 1856. "Sierra Madre, Mexico" (between the cities of Mazatlán and Durango or Durango and Tepic in Sinaloa, Durango or Nayarit), *Seemann 2186*, Nov. 1849–Feb. 1850 (K-Type).

Cracca madrensis (Seem.) Kuntze, Rev. Gen. **1:** 175. 1891, basonym misattributed to Benth.

Galactia marginalis Seem. Bot. Voy. Herald pl. 61. 1856, not Benth.

Decumbent, suffruticose perennial; stems prostrate, about 2 dm. long from a slender woody crown, nearly terete below, 2 mm. in diameter, angular above. Stems, petioles, petiolules, stipules and axes of the inflorescences thinly strigillose with cinereous hairs or nearly glabrous. Leaves unifoliolate, the petioles (5–)7–15 mm. long; stipules linear, acuminate, 5–10 mm. long, persistent, brown; leaflets elliptic or oblong-elliptic, acute, obtuse or rounded at apex and base, mucronate, the principal leaflets 25–50 mm. long, 12–23 mm. wide, thin but coriaceous, glabrous above or with a few short appressed hairs along the midrib and lateral veins, the veins prominent, reticulate, the leaflets paler below, sparsely strigillose with cinereous hairs 0.2–0.4 mm. long; petiolules 1–2 mm. long. Inflorescences terminal and axillary, the terminal leafless, 9–10 cm. long, the peduncle 1.5–3.5 cm. long, one inflorescence with a short lateral branch from the lowermost node; axillary inflorescences short, 2–3 cm. long, with a single leaf; axes of the inflorescences stiff, flattened (1.5–2 mm. wide) below the 2–9 flowering nodes, 2-edged, the terminal inflorescence exceeding the leaves; buds ca. 5 at a node, probably 2 or 3 of these flowering. Primary bracts lanceolate or linear-lanceolate, acuminate, 5–10 mm. long, rigid, brown, persistent; secondary bracts linear, acuminate or subulate, 3–5 mm. long, persistent. Pedicels 9–11 mm. long, slender, ascending. Dried flowers about 15 mm. long. Calyx campanulate, 3.5–5 mm. long, thinly strigillose with rusty and cinereous hairs, the tube 2–2.5 mm. long, the upper lobes subulate, 1–2.5 mm. long, the lateral and lowermost triangular-lanceolate, acuminate, 1.5–3 mm. long. Flower-color unknown, the dried flowers brown; blade of the banner suborbicular, ca. 12 mm. in diameter, retuse, strigillose on the back with silky brownish hairs; wings ca. 14 mm. long, auricled; keel ca. 13–14 mm. long, exauriculate. Staminal tube ca. 8.5–11 mm. long. Ovary strigillose along the sutures, the valves nearly glabrous; ovules ca. 6. Mature fruit and seeds unknown; young legume sparsely strigillose on the valves, strigillose along both sutures with minute hairs 0.2 mm. long.

Distribution. Known only from the type-locality.

Specimen examined. MEXICO. Sinaloa, Durango or Nayarit:

"Sierra Madre" (between the cities of Mazatlán and Durango or Durango and Tepic), *Seemann 2186*, Nov. 1849–Feb. 1850 (K).

The nearly glabrous, thin but rigid, unifoliolate leaves are characteristic. If the mature pod, when collected, proves to be glabrous, it will supply an additional conspicuous character. *Tephrosia madrensis* appears to be most closely related to *T. tepicana* and to an undescribed species from Guatemala represented by *Steyermark 51790* (F) (see Standley & Steyermark 1946, p. 356).

22. **Tephrosia Lindheimeri** A. Gray

Tephrosia Lindheimeri A. Gray, Bost. Jour. Nat. Hist. **6:** 172. 1850. "Muskit prairies, on the Liano," [Llano County?], Texas, *Lindheimer Distrib. No. 592*, Aug. 1847 or 1848 (GH-Type; MO, NY, US).

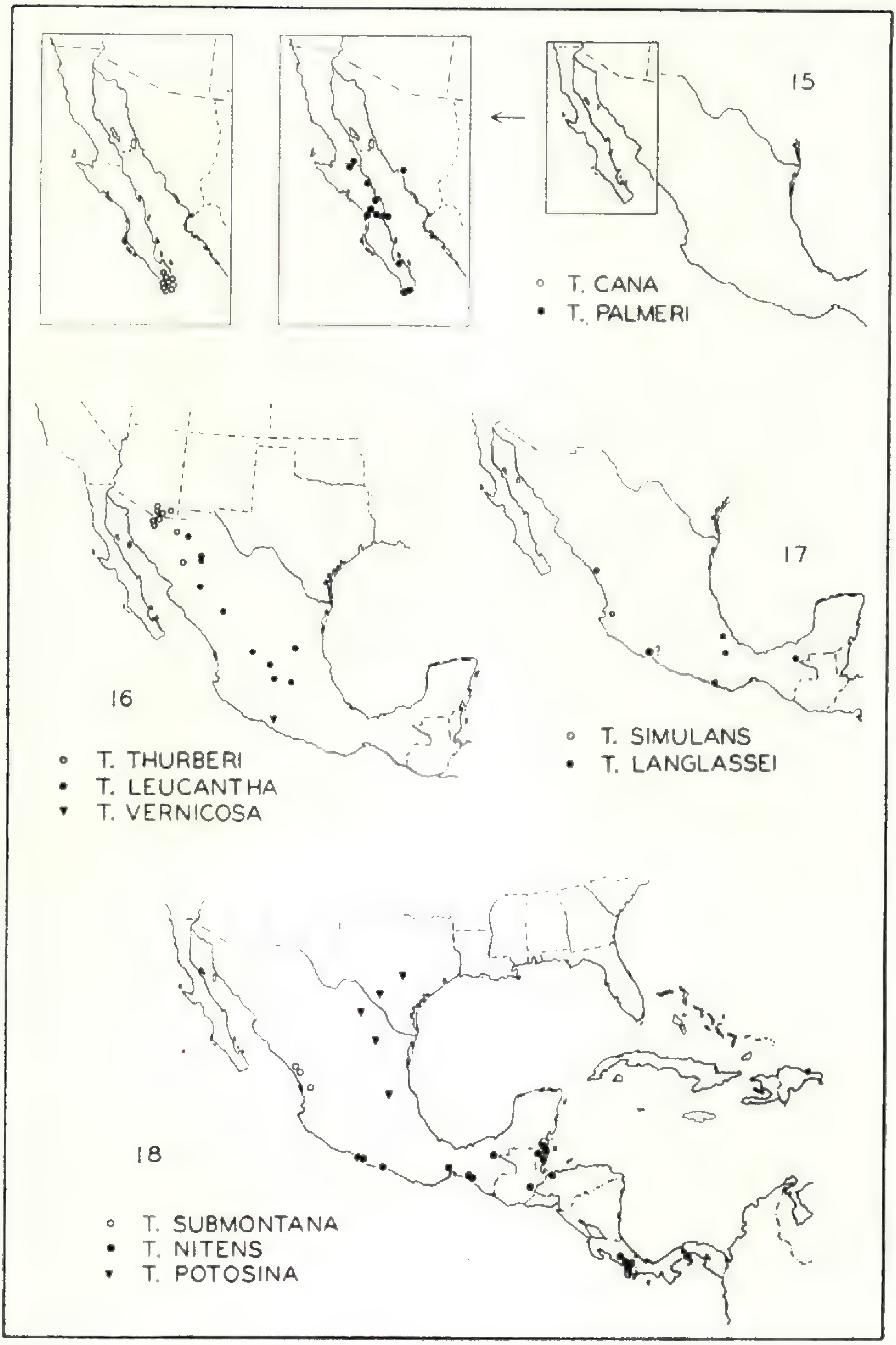
Cracca Lindheimeri (A. Gray) Kuntze, Rev. Gen. **1:** 175. 1891.

Prostrate or decumbent perennial herb from a woody crown and woody cylindrical tap-root (–1.5 cm. thick); stems several, up to 1 m. long, somewhat flexuous, branching sympodially or partially so, terete or angled. Stems, petioles, rachises and peduncles of the inflorescences hirtellous to hirsutulous with soft dense whitish ascending or spreading hairs. Leaves 5–15(–20) cm. long, ascending; petioles (1.6–)2.5–4.5 cm. long, shorter or (more often) longer than the lowermost leaflets of a leaf; stipules linear, acuminate, 12 mm. or less long, striate, becoming brown, often deciduous; leaflets of the principal leaves (5–)7–15(–19), mostly 9–11, obovate to broadly obovate-cuneate, or nearly orbicular or elliptic, the apex obtuse, retuse or emarginate with a slender mucro, (11–)18–33(–37) mm. long, (7–)12–21(–27) mm. broad; leaflets thin but somewhat rigid, dull, grayish-green, densely strigillose to short-strigose or hirtellous to hirsutulous with white hairs to nearly glabrous with but a few appressed hairs around the margins above, moderately to densely hirtellous to hirsutulous with fine ascending hairs below, appearing hoary or silky, the margins of the leaflets conspicuously bordered with short white antrorsely directed hairs, the veins conspicuous, pale to brownish beneath; petiolules 1–3 mm. long. Inflorescences terminal, either opposite the leaves or at the ends of axillary branches which may overtop the primary branches, 7–30 cm. long, ascending to erect, leafless, the flowering nodes 3–18; buds 4 or 5 at a node, 2 or 3 flowering and fruiting. Primary bracts lanceolate, long-acuminate, to linear-lanceolate, 8–10 mm. or less long, inconspicuous, deciduous, falling soon after anthesis; secondary bracts linear-lanceolate, 2–4 mm. long, deciduous. Pedicels slender, becoming stout in fruit, (4–)5–9 mm. long, ascending. Dried flowers 13–15 mm. long. Calyx 5–6 mm. long, hirsutulous with soft white hairs, the upper lobes deltoid, short-acuminate, 2–3 mm. long, the lateral lobes deltoid-lanceolate, acute, 3–4 mm. long, the lowermost lobe lanceolate, acuminate, keel-like, 4–6 mm. long. Corolla rose-purple, the banner with a white spot near the base of the

blade; blade of the banner suborbicular to rounded-quadrate, 11–13 mm. high, 12–15 mm. broad, hirtellous to hirsutulous with white hairs on the back, the claw 3 mm. long; wings 10–15 mm. long, with a small deltoid auricle, the claw 3 mm. long; keel 13–15 mm. long, with or without an auricle, the claw 3–3.5 mm. long. Staminal tube 10–11 mm. long, the vexillary stamen coherent with the tube along the middle third, flat, without an angular callosity on the upper side near the base. Ovary densely silky, hirtellous or strigillose; ovules 5–6. Legume shaped roughly like a long parallelogram, somewhat curved and narrowed near the base, (2.5–)4–5 cm. long, 7–8.5 mm. broad, horizontal or ascending, stramineous, moderately to densely hirtellous with soft white hairs, appearing velutinous; seeds (1–)4–6, oblong to suborbicular in outline, the ends often flattened by crowding, plump or flat, 5–7 mm. long, 4–5 mm. wide, stramineous to dirty tan, unmarked. Somatic chromosomes 22. Flowering collections from early April to September.

Distribution. Well-drained sandy, decomposed granite or limestone soils, roadsides, grassy areas and open oak woods or mesquite stands, southern Texas from Burnet and Llano Counties to Harris, Zavala and Cameron Counties and perhaps (?) with an isolated station in Cooke County. Map 14.

Specimens examined. UNITED STATES. Texas. Without definite locality: *C. Wright* (GH, NY, US); *Nealey*, 1888 (DS); *Wilkinson 177* (MO); from Bexar to the Rio Grande, *Berlandier 958* (MO), *2388* (GH, MO), *3133* (GH, MO, NY, US). Aransas Co.: Rockport, *Shulz*, 1938 (F). Bexar Co.: Applewhite Road, 18 mi. south of San Antonio, *Sister Mary Metz 626* (NY); San Antonio (TEX); s.w. of San Antonio, *Tharp*, 1926 (TEX); 15 mi. south of San Antonio, *Shulz 439* (US). Burnet Co.: Granite Mt. (DS, MO); granite region of Burnet, *Reverchon 1664* (MO); Burnet, *Fisher 3626* (CAS, US); s.e. corner of Burnet Co., *Hill 27* (US). Cameron Co.: *Bailey 242* (US). Comal Co.: New Braunfels, *Dapprich 6861* (SMU). Cook Co.?: Gainesville (county not indicated on label) (this station omitted from map), *E. Russell*, 1933 (UC). Dimmit Co.: Carrizo Springs, *Hoglund*, 1930 (TEX); east of Carrizo Springs, *M. E. Jones 28558* (DS, GH, MO, POM, UC, US). Duval Co.; Peña Station, *Havard*, 1884 (F, GH). Frio Co.: 14 mi. south of Pearsall, *Shreve 9445* (GH); Dilley, *Innes & Moon 1310* (GH, MO, TEX); Dilley, *Reverchon*, 1905 (OKL); along highway just n.e. of Dilley on Route 81, *Moore & Wood 3617* (GH, UC, Bailey Hortorium); sandy upland in open mesquite stand near semi-permanent pool, *Wolcott & Barkley*, 1946 (MO, PENN, TEX). Gonzales Co.: *Bogush 1305* (GH, TEX); *Normand*, 31 May 1929 (TEX, UC); 5 mi. n.w. of Westoff, *Muller 8016* (SMU); *Bogush*, 1926 (NY), *1305* (US); Ottine, *Cory 5709* (GH, POM). Guadalupe Co.: ca. 10 mi. south of Seguin, *Webster & Rowell 7095* (TEX); 13 mi. south of Seguin, *Wolcott & Barkley 16T435* (TEX); in limestone soil, Seguin, *Groth 181* (CAS, F, GH, NY, US). Harris Co.: open woods near the San Jacinto River, east of Houston, *Small & Wherry 11805* (NY). Hidalgo Co.; Rio Grande Valley, *M.*


15
T. CANA
T. PALMERI
16
T. THURBERI
T. LEUCANTHA
T. VERNICOSA
17
T. SIMULANS
T. LANGLASSEI
18
T. SUBMONTANA
T. NITENS
T. POTOSINA

Walker 71 (TEX, UC). Kleberg Co.: Kingsville, *Sinclair*, 1940 (TEX). LaSalle Co.: near Cotula, *Perkins & Hall 2323* (POM); Millett, *Trelease*, 1897 (MO). Llano Co.: between Enchanted Rock and Llano, *Tharp*, 1936 (GH, SMU, UC); near Enchanted Rock, *Whitehouse*, 1930 (TEX). Llano Co.?: "muskit prairies on the Llano," *Lindheimer 592* (GH, NY, MO, US), Oct. 1847 (GH, MO). Webb Co.: Laredo, *E. Palmer 258*, 1879 (GH), *250*, 1880 (US). Willacy Co.: along roadside, north of Raymondville, *Clover 1198* (NY). Wilson Co.: Wisdom Ranch, 20 mi. east of San Antonio, *Cutler 3225* (MO); Kicaster School, *Parks R2328* (MO); along San Antonio Highway at Wilson-Bexar County line, *Drushel 9857* (NY, US); 7 mi. n.w. of La Pryor, *Hedrick 272* (UC).

Tephrosia Lindheimeri is discussed with the following species.

23. **Tephrosia potosina** Brandeg.

Tephrosia potosina Brandeg. Univ. Calif. Publ. Bot. **4:** 272. 1912. Near Rascón, San Luis Potosí, Mexico, *C. A. Purpus 5273* (UC-Type; GH, MEXU, MO, NY, US).

Cracca potosina (Brandeg.) Standl. Contr. U. S. Nat. Herb. **23:** 472. 1922.

Decumbent perennial herb from a slender woody crown and heavy woody tap-root 1.5 cm. thick; stems 1 to several, sympodial or partially so, somewhat flexuous, slender (–2.5 mm. thick), up to 5 dm. long, axillary branches often poorly developed. Stems, petioles, rachises and peduncles of the inflorescences hirsutulous with spreading, often somewhat retrorse, tawny, rusty or sordid hairs. Leaves 7–22 cm. long, ascending; petioles (1.5–)2.5–10 cm. long, longer than the lowermost leaflets; leaflets 3–9, predominantly 5–7, obovate to broadly obovate-cuneate or orbicular, the apex obtuse or retuse, mucronate, 1–5 cm. long, 0.7–4(–4.5) cm. wide, dull, bluish-green, rigid but not coriaceous, completely glabrous above, moderately to very densely hirsutulous with ascending to spreading cinereous to tawny hairs, sometimes appearing pilose or silky, the margins of the leaflets bordered with usually inconspicuous tawny to rusty antrorsely directed hairs, the veins pale to reddish beneath. Inflorescences terminating either the main or axillary branches, erect or ascending, up to 27 cm. long. Dried flowers 13–20 mm. long; flower-dimensions as in *T. Lindheimeri;* corolla rose-purple with a green spot at the base of the blade of the banner. Pedicels, calyx and back of the banner usually hirsutulous with golden or rusty hairs. Ovules 4–8. Legume 2–5.5 cm. long, 6–8 mm. wide, stramineous to dirty brown, hirtellous with tawny, rusty or tan hairs; seeds (1–)4–8, suborbicular to subquadrate in outline, the ends sometimes flattened by crowding, plump, 4.5–5.5 mm. long, 4–5 mm. wide, stramineous, unmarked. Somatic chromosomes 22. Plants otherwise similar to *T. Lindheimeri*. Flowering collections from April to August.

Distribution. Hays(?) and Uvalde Counties, Texas, United States, to Coahuila, Nuevo León and San Luis Potosí, Mexico. Maps 14 and 18.

Specimens examined. UNITED STATES. Texas. Hays Co.?:

San Marcos and vicinity (county not noted), *S. W. Stanfield* (NY). Uvalde Co.: gravelly open ground, *E. J. Palmer 12296*, 18 June 1917 (GH, MO, NY, US); rocky banks along Leana River, near Uvalde, *E. J. Palmer 33665*, 30 Apr. 1928 (GH, MO, NY, PH, US); dry rocky ground, Sabinal, *E. J. Palmer 10246*, 19 June 1916 (DS, MO, US).

MEXICO. Coahuila: Hacienda La Rosita, Muzquiz, *Wynd & Mueller 298*, 26 June 1936 (A, MO, NY, US); Muzquiz, *E. Marsh 50*, 1935 (F, GH, TEX), *1152*, Apr. 1938 (GH). Nuevo León: Sierra Madre near Monterrey, *Pringle 2796*, 29 May 1889 (GH, MEXU, US); Diente Canyon (ca. 12 mi. south of Monterrey), Sierra Madre, Monterrey, *C. & M. Mueller 512*, 11 July 1933 (F, TEX), *512*, 23 July 1933 (A); Horsetail Falls, 38 km. (23 mi.) south of Monterrey on Pan-American Highway, *C. & E. Frye 2463*, 25 Apr. 1939 (GH, UC, US); limestone soil (?), weedy hillside pasture between Cieneguilla and Hacienda Vista Hermosa on road from Pan-American Highway to Horsetail Falls (Cola de Caballo), ca. 38 km. south of Monterrey, *Moore & Wood 3618*, 28 June 1948 (GH, UC, Bailey Hortorium). San Luis Potosí: Rascón, *Purpus 5273*, Aug. 1911 (GH, MEXU, MO, NY, UC).

Tephrosia potosina and *T. Lindheimeri* constitute a pair of closely related but distinct species without obvious close relationships with any other American members of the genus. The combination of characters by which they stand apart includes the sympodial decumbent habit, obovate to orbicular leaflets, rose-purple flowers, cohering vexillary stamen, broad pods, and few (4–8), large, stramineous, unmarked seeds. The two occupy contiguous ranges and appear to be the only species of the barbistyled group which occur at least partially on soils derived from calcareous rocks. These two species are, however, distinct from each other in a number of particulars set forth in the accompanying table. The most conspicuous of these differences are those related to stature and to number and pubescence of the leaflets.

Although entire plants of *Tephrosia Lindheimeri* are seldom collected, when this species is seen in the field the much longer stems and more robust habit are conspicuous in comparison with the relatively slender and short stems of *T. potosina* (which in all of the herbarium-specimens seen have been collected with a part of the slender, woody crown). In the single colony of each which I have studied this habital distinction was very striking. Although from the available herbarium-specimens ecological conditions might be suspected of being responsible for the relatively small size of plants of *T. potosina*, all indications were to the

	T. Lindheimeri	*T. potosina*
Stature	Coarse, stems to 1 m. long, 5 mm. thick.	Slender, stems to 0.5 m. long, 2.5 mm. thick.
Leaves	5–15(–20) cm. long.	7–22 cm. long.
Petioles	(1.6–)2.5–4.5 cm. long, pubescence ascending or spreading, cinereous.	(1.5–)2.5–10 cm. long, pubescence often spreading-retrorse, often rusty.
Leaflets	(5–)7–15(–19), predominantly 9–11.	3–9, predominantly 5–7.
	11–37 mm. long, (7–)12–21 (–27) mm. wide.	10–50 mm. long, 7–40(–45) mm. wide.
Indument of upper surfaces of leaflets	Densely strigillose or hirtellous to hirsutulous or short-strigose with cinereous hairs, to nearly glabrous with only a few appressed hairs around the margins; margins conspicuously bordered with white hairs.	Completely glabrous; margins inconspicuously bordered with tawny or rusty hairs.
Flowers	Banner with a white spot at the base of the blade.	Banner with a green spot at the base of the blade.
	Calyx and back of banner with white or cinereous hairs.	Calyx and back of banner with golden or rusty hairs.
Ovules and seeds	5–6	4–8

contrary, with plants of this species less than one-half the size of fruiting plants of *T. Lindheimeri* (as seen in Texas) fruiting abundantly in a habitat seemingly far better suited than Texas to profuse growth.

The 3–9 (predominantly 5–7) leaflets of *Tephrosia potosina* are a very constant character. On some 90 plants examined in a colony near Monterrey (*Moore & Wood 3618*) no leaves bore more than 9 leaflets. In *T. Lindheimeri*, however, the leaflet-number varies from 5 to 19, with 9–11 occurring most commonly.

Although the indument of the leaflets has proved to be untrustworthy in a number of species of *Tephrosia*, in this instance leaflet-pubescence shows perfect correlation in all of the available material with the leaflet-numbers given above. Within a single colony of *Tephrosia Lindheimeri*, plants with the upper surfaces of the leaflets evenly hirsutulous, or with the center of the leaflets glabrous, or grading from this to the restriction of the whitish hairs to a narrow submarginal zone are encountered. Although

several collections show some very nearly glabrous leaflets, there are always a few appressed whitish hairs near the margins of the leaflets, in addition to the conspicuous edging of antrorsely directed whitish hairs on the margins themselves. The leaflets of *Tephrosia potosina*, however, are always completely glabrous above and the marginal border of tawny to rusty hairs is inconspicuous. In addition to the herbarium-material, mass collections from 129 plants of *T. Lindheimeri* (*Moore & Wood 3617*) and 90 of *T. potosina* (*Moore & Wood 3618*) showed no exceptions.

Further examination of fresh flowering material is desirable before much significance can be assigned to the color of the spot at the base of the banner. The color of hairs on calyx and back of the banner does, however, seem to be of diagnostic importance in these two species.

24. **Tephrosia saxicola** sp. nov.

Planta perennis herbacea decumbens. Caules graciles basi sublignosi, 1–5 dm. longi, sparso-strigillosi. Folia 3–9 cm. longa; petioli (2–)5–17 mm. longi; stipulae lineari-acuminatae, persistentes; foliola 9–19, angustato-elliptica, oblonga vel lineari-oblonga, mucronata, (8–)10–23 mm. longa, 3–6(–8) mm. lata, coriacea, supra nitida, glabra vel nervus primarius strigillosus, subtus substrigillosa pilis albidis, pallida vel canescentia. Inflorescentiae terminales vel axillares, 3–20 mm. longae, laxae, ascendentes plerumque efoliatae; nodi floriferi 5–20. Bracteae primariae lineari-lanceolatae vel subulatae, 4–8 mm. longae, brunneae, persistentes. Pedicelli 4–9 mm. longi. Calyx campanulatus, 4–5.5 mm. longus, strigillosus pilis aureis et cinereis; lobi deltoidei vel deltoideo-ovati, abrupte acuminati, lobi superiores 1–1.5 mm. longi, lobi laterales 2.5–3 mm. longi, lobus infimus 3 mm. longus. Vexillum roseopurpureum, basi macula viridia; lamina 11–13 mm. longa, 13–14 mm. lata; alae 13–15 mm. longae; carina 13–14 mm. longa, ungue 3 mm. longo. Tubus staminalis 10–11 mm. longus; stamen vexillare tubo connatum, basi liberum. Ovarium strigillosum, 6–9-ovulatum; stylus barbatus. Legumen immaturum 3 cm. longum, 5 mm. latum, raro-strigillosum pilis cinereis.

Decumbent perennial herb, somewhat woody at the base; stems slender, 1–5 dm. long, clustered, much branched, monopodial, terete below, somewhat angled above, striate. Stems, petioles, rachises and axes of inflorescences thinly strigillose with whitish hairs. Leaves 3–9 cm. long, spreading or ascending, the petioles (2–)5–17 mm. long, mostly shorter than the lowermost leaflets, the rachis (0.5–)2.5–5.5 cm. long, both petiole and rachis channeled on the upper side; stipules linear, acuminate, 10 mm. or less long, brown, persistent; leaflets of the principal leaves 9–19, narrowly elliptic to oblong or linear-oblong, (8–)10–23 mm. long, 3–6(–8) mm. wide, the base and apex acute to rounded; leaflets coriaceous, lustrous, glabrous or with a few short white hairs along the midrib and nearly lacking stomata above, moderately white-strigillose beneath, appearing pale or canescent; petiolules 0.5–1.5 mm. long, strigillose. Inflorescences terminal and axillary, 3–20 cm. long, ascending, slender, often lax, sometimes with 1–3

short branches from the axils of bracts, leafless or the lowermost node with a leaf, the peduncle 1–4 cm. long, the axis angular, the flowering nodes 5–20, rather evenly spaced; buds 3–4 at a node, 2–3 of these flowering. Primary bracts linear-lanceolate to subulate, 4–8 mm. long, brown and persistent, conspicuous; secondary bracts subulate, 2–4 mm. long, brown, persistent. Pedicels 4–9 mm. long, ascending, strigillose with golden or rusty hairs. Dried flowers 13–15 mm. long. Calyx campanulate, 4–5.5 mm. long, strigillose with fine golden or rusty and cinereous hairs, the tube 2.5–3 mm. long, the lobes triangular to triangular-ovate, rather abruptly acuminate, the upper 1–1.5 mm. long, the lateral 2.5–3 mm. long, the lowermost 3 mm. long. Corolla "bright pink-lavender", the banner with a conspicuous green area near the base; blade of the banner 11–13 mm. high, 13–14 mm. broad, strigillose on the back with fine silky golden hairs, the claw 3–4 mm. long; wings 13–15 mm. long, 4–5 mm. broad, auricled, the claw 2.5–3 mm. long; keel 13–14 mm. long, 6–7 mm. deep, the claw 3 mm. long. Staminal tube 10–11 mm. long, the vexillary stamen coherent with the tube, free at the base, with a prominent callosity on the upper side near the base. Ovary strigillose, the style barbate; ovules 6–8. Mature fruit not seen, the immature legume ca. 3 cm. long, 5 mm. wide, slightly curved upward, thinly strigillose with cinereous hairs. FIG. 1, PLATE 1153.

DISTRIBUTION. Known only from the type-locality. Map 19.

SPECIMENS EXAMINED. MEXICO. SINALOA: Caespitose, suffrutescent, spreading herb with bright pink-lavender flowers, open rocky slope with lower pines and oaks, 4500 ft. (1400 m.), Puerto a Tamiapa, Dto. de Badiraguato, *H. S. Gentry 5812*, 5 March 1940 (GH-Type; DS, MEXU, MO, NY, UC) (see Gentry 1946 for map and exact location).

Tephrosia saxicola is clearly distinguished by the 9–19 small, coriaceous leaflets, by the slender, often elongate inflorescences with persistent bracts, and by the deltoid to deltoid-ovate lobes of the calyx. The short, thin and tightly appressed pubescence also appears to be characteristic. This species is probably most closely related to *T. Seemannii*, but that poorly known species has very short inflorescences, narrowly triangular, subulate calyx-lobes and very much longer pubescence.

25. **Tephrosia Seemannii** (Britten & Bak. f.) K. Schum.

Cracca Seemanni Britten & Bak. f. Jour. Bot. **38:** 16. 1900. "In woods, Sierra Madre", (between Mazatlán and Durango or Durango and Tepic, in Sinaloa, Durango or Nayarit), Mexico, *Seemann 2191*, Nov. 1849–Feb. 1850 (K, GH).

Tephrosia Seemannii (Britten & Bak. f.) K. Schum. in Just, Bot. Jahresb. **28**(1)**:** 442. 1902.

Herbaceous or suffruticose perennial from a slender crown; stems ap-

parently decumbent or erect, 1.5–4 dm. long, terete or somewhat angled above, striate, 1–2 mm. thick, slightly flexuous, often with short axillary branches 1.5–7 cm. long. Stems, petioles, rachises, petiolules, inflorescences, pedicels and calyces sparsely to densely strigillose with fine white or gray hairs and sparsely to densely covered with coarser spreading hairs up to 2 mm. long. Principal leaves spreading, 2.2–5.5 cm. long, the petioles (1.5–)2–6 mm. long, shorter than the lowermost leaflets, the rachis 1.5–4 cm. long; stipules linear, long-acuminate to linear-subulate, 4–8 mm. long, brown and persistent; leaflets of the principal leaves 9–21, narrowly oblong-elliptic to lanceolate-oblong or oblong, the base usually obtuse or rounded, rarely narrowed, the apex acute, obtuse or rounded, rarely retuse, mucronate, tapering evenly or slightly broader below the middle, 7–15 mm. long, 2.5–5.5 mm. wide, those near the center of the leaf longest, the lowermost shortest; leaflets coriaceous, the margins usually slightly involute, the midvein conspicuously impressed, the parallel lateral veins obscure, the veinlets between somewhat impressed, forming a network, the areoles not elongate but more or less isodiametric; upper epidermis lacking stomata; upper surface of leaflets with very fine appressed to ascending hairs 0.2–0.6 mm. long, becoming more or less glabrous except along the midrib; lower surface of leaflets densely strigose with white or cinereous hairs, the midrib conspicuous, brown or reddish, with scattered spreading hairs about 1 mm. long, appearing somewhat silky but not shining or silvery; petiolules inconspicuous, ca. 0.6 mm. long. Inflorescences terminating the main branches or short leafy axillary branches, 1–4 cm. long, the peduncle up to 1.2 cm. long, the inflorescences few-flowered with 2–7 flowering nodes; buds ca. 3 at a node, 2 or 3 flowering. Primary bracts linear to linear-lanceolate, acute or acuminate, often 3-toothed, brown, persistent, 4–7 mm. long; secondary bracts linear-subulate, 3–5 mm. long, brown, apparently persistent. Pedicels slender, ascending, 4–11 mm. long. Dried flowers ca. 13–15 mm. long. Calyx ca. 6 mm. long, the upper lobes subulate, ca. 2 mm. long, the lateral and lowermost narrowly triangular-subulate, ca. 4 mm. long. Corolla "purple" (Seemann), apparently with a green spot at the base of the banner within, brown when dry; blade of the banner ca. 11 mm. high, finely white-hairy on the back, the claw ca. 2 mm. long; wings ca. 14 mm. long, ca. 4 mm. wide, the claw 2.5 mm. long; keel ca. 14 mm. long, exauriculate, the claw ca. 3.5 mm. long. Staminal tube 10–11 mm. long, the vexillary stamen coherent with the staminal tube, free at the base, thickened on the upper side near the base. Ovary strigillose or ascending-hirtellous with white hairs, the style barbate on the inner surface; ovules ca. 8. Very young legumes hirtellous with fine white or (along the sutures) rusty hairs; mature legumes and seeds unknown.

Distribution. Mountains of southern Sinaloa and probably Nayarit, Mexico. Map 19.

Specimens examined. MEXICO. Sinaloa, Durango or Nayarit: In woods, Sierra Madre, (between the cities of Mazatlán and Durango or

Durango and Tepic), *Seemann 2191*, Nov. 1849–Feb. 1850 (GH, K). SINALOA: Sierra de Chabarria, *J. G. Ortega 4049*, 1921 (US).

This little-known species was thought by Seemann to be related to *Tephrosia virginiana*, a supposition in which he was followed by Britten and Baker and by Rydberg. It appears, however, that the real affinities of *T. Seemannii* are with *T. Pringlei* of central Oaxaca and *T. saxicola* of central Sinaloa; the resemblance to *T. virginiana* is superficial only. *Tephrosia Seemannii* strongly resembles *T. Pringlei* in the number, size and shape of the leaflets, which are finely hairy above and densely white-hairy beneath, but rather more coriaceous in the former species. The persistent bracts are also similar and floral measurements overlap. The two are clearly different, however, in the venation of the leaflets, in the distribution of stomata and in several other tendencies as indicated below. Until more material is available little dependence can be placed upon floral characters.

	T. Seemannii	*T. Pringlei*
Stems	1.5–4 dm. long.	1.2–5 dm. long.
Stipules	Linear, long-acuminate, to linear-subulate.	Linear, acute or acuminate.
Leaflets	9–21, narrowly oblong-elliptic to lanceolate-oblong or oblong, tapering evenly or slightly wider below the middle.	9–25, obovate, obovate-cuneate, narrowly cuneate or elliptic, usually broadest above the middle.
	Parallel lateral veins inconspicuous, the areoles between the lateral veins nearly isodiametric.	Parallel lateral veins conspicuous, the areoles between the lateral veins distinctly elongate.
	Upper epidermis without stomata.	Upper epidermis with stomata.
Nodes of the inflorescence	2–7	3–12

26. **Tephrosia Pringlei** (Rose) Macbr.

Cracca Pringlei Rose, Bot. Gaz. **40:** 143. 1905. Gravelly slopes under oaks, hills of Las Sedas, Dist. Etla, Oaxaca, Mexico, *C. G. Pringle 6741*, 22 July 1897 (US 42396-Type; CAS, GH, MEXU, NY, PH, UC, US).

Tephrosia Pringlei (Rose) Macbr. Field Mus. Publ. Bot. **4:** 87. 1925.

Much-branched herbaceous perennial from a slender branching woody crown and heavy woody root; stems many, 1–2.5 dm. long, apparently erect or somewhat decumbent, terete or somewhat angled, striate. Stems,

petioles, rachises, petiolules and axes of inflorescences moderately hirtellous to hirsutulous or strigillose to strigose with fine cinereous or brownish hairs. Principal leaves 2.5–6.5 cm. long, the petioles 2–8(–9) mm. long, the rachis 1.8–5 cm. long, stipules linear, acute or acuminate, 5–10 mm. long, 1–1.5 mm. or less wide, persistent, brown; leaflets of the principal leaves 9–25, obovate, obovate-cuneate, narrowly cuneate or elliptic, usually broadest above the middle, usually narrowed toward the base, the apex obtuse, rounded or retuse, mucronate, 5–15 mm. long, 2–5.5(–7) mm. wide, those of a leaf rather uniform in size, light green, firm, veiny on the upper side, the parallel lateral veins evident, the smaller veinlets forming elongate areoles between, the upper epidermis with stomata; upper surfaces of the leaflets nearly glabrous to sparsely to densely covered with fine cinereous hairs, at least the midrib with a few hairs, appearing silvery and silky or somewhat woolly below, the lower surfaces densely strigillose and strigose to hirsutulous with cinereous hairs. Inflorescences terminal (or occasionally 1–3 additional short inflorescences axillary), usually compact, 1.5–12 cm. long, few-flowered, leafless or one node with a leaf, the peduncle up to 5 cm. long, the flowering nodes 3–12; buds 3–5 at a node, 2 or 3 flowering, 1 or 2 fruiting. Primary bracts linear to linear-lanceolate, acuminate, 3–7 mm. long, persistent, brown; secondary bracts 2–4 mm. long, linear, persistent. Pedicels slender, 6–12 mm. long in flower, 10–16 mm. long in fruit, ascending. Dried flowers 14–20 mm. long. Calyx and pedicels usually doubly pubescent, hirtellous to strigillose and hirsutulous to short-strigose with cinereous or brownish hairs. Calyx 6–10 mm. long, the tube 2–3 mm. long, the upper lobes long-acuminate (2.5–)3.5–6 mm. long, the lateral and lowermost lanceolate, long-acuminate, 4–7 mm. long, usually nearly equal in length. Corolla in dried specimens purple to brown, the banner with a conspicuous yellowish-green spot near the base; blade of the banner suborbicular, 11–15 mm. high, 12–15 mm. wide, covered on the back with fine golden and white hairs, the claw 2–3 mm. long; wings 13–16 mm. long, 4–6 mm. wide, the claw 2–3 mm. long, not conspicuously auricled, but rounded at the base on the upper side and folded, thus appearing auriculate; keel semilunate, ca. 15 mm. long, exauriculate, the claw 2.5–3 mm. long. Staminal tube 10–12 mm. long, the vexillary stamen coherent with the tube, free at the base, thickened but not conspicuously so on the upper side near the base. Ovary densely strigillose or hirtellous with white or (along the margins) rusty hairs. Partially mature pod 4 mm. long, 6–6.5 mm. wide, the upper side slightly curved downward, tipped by the persistent style-base which curves downward, compressed, hirtellous with brown and white hairs; seeds 6–8, the mature seeds unknown. Flowering collections late June and July.

Distribution. Oak woods, 2000–2300 m., central Oaxaca, Mexico. Map 19.

Specimens examined. MEXICO. Oaxaca: San Fo. Huiso, 7000 ft., *Galeotti 3458*, June 1849 (US, NY); gravelly slopes under oaks, hills of Las Sedas, Dist. Etla, *Pringle 6741*, 22 July 1897 (CAS, GH, MEXU, NY,

PH, UC, US); La Carbonera, 2200 m., Dist. Etla, *Conzatti 4019*, 28 June 1920 (MEXU); Rancho Nopalera, Camino Montelobos, Dist. Nochixtlán, 2000 m., *Conzatti 1868*, 22 June 1907 (NY, US); Cerro de Nueve Puntas, Matatlán, Dist. Tlacolula, 2500 m., *Conzatti & Vazquez 1495*, 19–23 June 1906 (MEXU, NY, US); Cuatro Venados, Dist. Zimatlán, 7500 ft., *L. C. Smith 61*, 27 June 1894 (GH, US).

27. **Tephrosia nicaraguensis** Oerst. ex Benth. & Oerst.

Tephrosia nicaraguensis Oerst. ex Benth. & Oerst. Kjoeb. Vidensk. Meddel. **1853:** 6. 1854. Savannas between Granada and Masaya, Nicaragua, presumably *Oersted 4622*, Dec. 1847 (F, US).

Cracca nicaraguensis (Oerst. ex Benth. & Oerst.) Kuntze, Rev. Gen. **1:** 175. 1891.

Tephrosia talpa S. Wats. Proc. Amer. Acad. **22:** 405. 1887. "Río Blanco, on hillsides under pines, growing in clumps," (about 10 mi. west by north of Guadalajara), Jalisco, Mexico, *Edward Palmer 161*, July 1886 (GH-Type; MEXU, NY, US).

Cracca talpa (S. Wats.) Rose, Bot. Gaz. **40:** 143. 1905.

Erect perennial or suffrutescent herb 2–5(–10?) dm. high; stems many from a heavy woody crown and thick woody root, monopodial. Stems, petioles, rachises, petiolules and axes of the inflorescences densely hirtellous or hirsutulous (or both) with cinereous or tawny hairs, appearing velvety or woolly. Leaves ascending or spreading, (8–)12–24 cm. long, the leaflets often drooping, the petioles (11–)23–57 mm. long, longer or shorter than the lowermost leaflets, the rachises (5–)7–16 cm. long; stipules linear, acuminate, 6–17 mm. long, 1 or rarely 1.5 mm. or less wide, persistent, becoming brown; leaflets of the principal leaves 9–21, narrowly oblong to oblong to elliptic, (11–)16–50(–60) mm. long, (7–)8–17(–19) mm. wide, (1.5–)2–4 times as long as broad, the lowermost leaflets shortest, the apex of leaflets obtuse, rounded or retuse, short-mucronate, the base obtuse (often narrower than the apex, rarely acute); leaflets thickish, dull, densely soft-hirtellous with fine cinereous hairs, often appearing velutinous or canescent above, conspicuously reticulate between the lateral veins below with the areoles nearly isodiametric, hirsutulous, especially along the midrib and parallel lateral veins which are conspicuously outlined with whitish or tawny hairs, often appearing somewhat woolly or silky; petiolules ca. 2.5 mm. long. Inflorescences usually terminal, stout, straight, 5–35 cm. long, or accompanied by 1–5 slender inflorescences 2–15 cm. long from the upper axils, the uppermost leaf often with axillary flowers, the peduncles of the inflorescences 2–10 cm. long, angular, the inflorescences bearing 5–ca. 25 flowering nodes which are buttressed below; buds 5–12 at a node, 4 or more flowering, 1–3 fruiting. Primary bracts linear, acuminate, 6–14 mm. long, 1 (or rarely 1.5) mm. or less wide, persistent; secondary bracts linear-subulate, 3–5 mm. long, usually persistent. Pedicels 2–5(–6) mm. long, ascending. Dried flowers 14–18 mm. long. Pedicels and calyces densely hirtellous and hirsutulous with rusty to cinereous hairs. Calyx (4–)5–7 mm. long, the upper lobes acuminate, 1–2

mm. long, the lateral deltoid or narrowly so, short-acuminate, (1.5–)2.5–3 mm. long, the lowermost lanceolate, acuminate, (1.5–)4–5 mm. long. Banner white becoming pink with age, the wings and keel apparently rose-pink or the keel paler, the corolla usually brown when dry; blade of the banner suborbicular to obovate, 14–17 mm. high, 13–18 mm. wide, densely covered with fine silky hairs on the back, the claw 2.5–4 mm. long; wings 15–18 mm. long, 3–5.5 mm. wide, auricled, the claw ca. 3 mm. long; keel 15–17 mm. long, with or without an auricle, the claw 3 mm. long. Staminal tube 11–13 mm. long, the vexillary stamen coherent with the tube, free at the base, with a conspicuous 2-lobed thickening on the upper side near the base. Ovary densely silky- to woolly-hirsutulous. Legume nearly straight or slightly curved downward and often narrowed near the base, 3–6 cm. long, 5–6.5 mm. wide, densely hirsutulous with cinereous to rusty hairs (about 1–1.5 mm. long), the hairs often matted, woolly or furry in appearance; seeds 4–8, brown variegated with black, nearly orbicular or subquadrate in outline, 3.6–3.8 mm. in diameter, laterally compressed.

Distribution. Well-drained rocky soils in open oak and pine woods, 400–1750 m., from southern Sonora and southwestern Chihuahua to Chiapas and Oaxaca, in Mexico, and to Guatemala, Honduras, El Salvador and Nicaragua. Map 3.

Specimens examined. MEXICO. Chihuahua: Sunny oak slope, Sierra Canelo, Río Mayo, *Gentry 2527* (A, F, MO); oak savanna, Batopilillas, Río Mayo, *Gentry 2613* (A, F, MO) (see Gentry 1942 for map). Sonora: Valley of the San Ignacio River, *Capt. E. K. Smith* (NY); Sierra Verde, *Schott*, 1855 (NY, US). Sinaloa: In open places, Mesa de Lagunillas, Ixtagua, San Ignacio, 440 m., *Montes & Salazar 449* (US); Ixtagua, San Ignacio, *Ortega 484* (MEXU); Cerro Colorado [ca. 30 mi. east of Culiacán], *Brandegee*, 1904 (UC); open rocky slopes on oak savanna, Mesa Malqueson, Cerro Colorado, 2500 ft., *Gentry 5176* (DS, GH, MO, NY, UC); Cofradia [east of Culiacán], *Brandegee*, 21 Oct. 1904 (UC, US). Durango: *Rose 2261* (US); Ramos to Inde, *Nelson 4711* (NY, US); Durango & vicinity, *Palmer 632*, 1896 (GH, MO, NY, UC, US); rocky slope 35 km. south of Durango, *Hernandez X. X2584* (GH). Guanajuato: Oak zone, Dolores Hidalgo to Guanajuato, *Kenoyer 2116* (GH). Querétaro: Hacienda [del] Ciervo, between San Juan del Río and Cadereyta, *Rose, Painter & Rose 9694* (GH, MEXU, NY, US). Jalisco: Guadalajara, *Holway 5151* (US); near Guadalajara, *Rose & Painter 7471* (GH, NY, US); rocky hills near Guadalajara, *Pringle 5137* (GH, MEXU), *9774* (GH, MO, NY, US), *4396* (MO, NY, PH, UC, US); barranca of Río Blanco near Guadalajara, 4500 ft., *Pringle 11437* (GH, MEXU, US); on hillsides under pines, Río Blanco, *Palmer 161*, 1886 (GH, MEXU, NY, PH, US); near Tequila, *Rose & Hough 4753* (US); open grassy hillside with rocky volcanic outcrops near top of hill ca. 4–5 km. beyond Tequila on road to Tepic, 4500 ft., *Moore & Wood 4830* (GH, UC, Bailey Hortorium); rocky mountain slopes with open oak woods near Arenal on highway from Guadalajara to Tequila, 5300 ft., *Moore & Wood 4834*

(GH, UC, Bailey Hortorium). México: Prairie, Volcán, Dist. Temascaltepec, 1410 m., *Hinton 1278* (GH, MEXU, NY, US). Morelos: Woods near El Rodeo, *Clausen 6059* (DS, MEXU). Guerrero: Clay soil, Valle Grande, Mont de San Cristobal (apparently in Dist. Montes de Oca), *Langlassé 324* (GH, US). Oaxaca: *Holway 3679* (GH); Oaxaca, 1750 m., *Conzatti & Gonzalez 39* (MO, US); Natividad Road, n.e. of Oaxaca, *Kenoyer 1567* (GH); valley of Oaxaca, 5500–7500 ft., *Nelson 1456* (US); San Felipe and Monte Albano, *Rose & Hough 4577* (US, NY-photo); San Benito, near Apango, 500 m., *Reko 3619* (US); Talea (Chinantla), *Galeotti 3466* (GH, NY, UC, US); Faldas del Fortín, 1600 m., Dist. del Centro, *Conzatti 3578* (MEXU); Ferrenos de Xochimilco, 1560 m., Dist. del Centro, *Conzatti 3645* (MEXU). Veracruz: Region of Orizaba, Borrego, *Bourgeau 2797* (part) (US). Chiapas: Chicomuselo, 800 m., *Matuda 4425* (A, MO, NY); Hacienda Monserrate, *Purpus 9143* (F, MO, US); rocky mountain slope east of Hacienda Monserrate, *Purpus 10092* (NY, UC, US), *Clausen & Cervantes 6101* (DS, MEXU).

GUATEMALA. Chiquimula: Grassy slope of Mount Tejás, near village of Sasmo, ca. 1 mi. n.w. of Chiquimula, 420–520 m., *Steyermark 30206* (F); dry, open, rocky slopes in openings of pine woods, Caracol Mountain, 1.5 mi. north of Quetzaltepeque, 1200–1400 m., *Steyermark 31375* (F). Huehuetenango: Along Río Cuilco between Cuilco and aldea of San Juan, 2.5 mi. west of Cuilco, 1200–1300 m., *Steyermark 50867* (F). Jutiapa: Oak and pine forest at La Pava below Acatempa, 1100 m., *Standley 77597* (F); open rocky pine forest, hills between Jutiapa and Plan de Urrutia, north of Jutiapa, 900–1200 m., *Standley 75602* (F); pine forest, low mountains west of Jutiapa, 900 m., *Standley 60565* (F). Zacapa: Rocky, dry hills between Monte Grande and Santa Rosalía, 300–1200 m., *Steyermark 42191* (F).

HONDURAS. El Paraiso: Dry rocky hillsides ca. 5 km. east of Ojo de Agua, 760 m., *Williams & Molina 10485* (UC).

EL SALVADOR. Santa Ana: Fondo del Cerro de la Olla, near Chalcuapa, *Calderón 1009* (NY, US).

NICARAGUA. Between Granada and Masaya, *Oersted 4622* (F, US).

Although *Tephrosia nicaraguensis* and *T. talpa* have previously been recognized as separate species, the differences have been mainly political, specimens from Guatemala southward being referred to the former and those from Mexico to the latter name. The type-collections correspond in all particulars, however, and clearly represent the same species. Rydberg apparently did not see authentic material of *T. nicaraguensis*, so that the differences given by him (1923) seem to have come solely from the original incomplete descriptions of the two species. In spite of the broad range of this plant no geographical variations are evident.

28. **Tephrosia submontana** (Rose) Riley

Cracca submontana Rose, Contr. U. S. Nat. Herb. **8:** 46. 1903. Between Pedro Paulo and San Blascito, Nayarit, Mexico, *J. N. Rose 3336*, 4 Aug. 1897 (US 302312-Type; GH, MEXU; NY-photograph).

Tephrosia submontana (Rose) Riley, Kew Bull. **1923:** 341. 1923.

Erect herbaceous to shrubby perennial ca. 1 m. high. Stems, petioles, rachises, petiolules, and axes of the inflorescences densely strigillose or hirtellous with rusty-brown hairs, velutinous or silky. Leaves 9–22 cm. long, the petioles 6–25 mm. long, shorter than the lowermost leaflets, the rachis 5–14 cm. long; stipules linear, acute or acuminate, 5–15 mm. long, ca. 1 mm. wide, persistent but often broken in herbarium-specimens; leaflets (11–)13–17, lanceolate, lance-oblong, or linear-oblong, the base rounded or obtuse, the apex acute, cuspidate, 2–6 cm. long, (5.5–)8–15 mm. wide, somewhat coriaceous, green, shining, minutely pubescent with hairs 0.1–0.2 mm. long above, the veins conspicuous, densely strigillose to strigose beneath with fine golden or silvery shining hairs, silky in appearance; petiolules 1.5–4 mm. long, slender. Inflorescences several, terminal and axillary, 7–35 cm. long, the peduncle 3–8 cm. long, the terminal inflorescence with 1 or 2 branches, leafless, erect, usually lax, many-flowered, the flowering nodes 5–40; buds 5–8 at a node, 3–6 of these flowering, 1 or 2 fruiting. Primary bracts lanceolate or linear-lanceolate, 10 mm. or less long, deciduous; secondary bracts linear-lanceolate or linear, 2–4 mm. long, deciduous. Pedicels ascending, 5–8 mm. long, rusty-strigillose or hirtellous. Dried flowers 20–30 mm. long. Calyx 6–7.5 mm. long, strigillose or hirtellous with rusty hairs, the tube ca. 4 mm. long, the lobes triangular to ovate and short-acuminate, the upper 1–1.5 mm. long, the lateral 3.5–4 mm. long, the lowermost 4 mm. long. Corolla of dried specimens purple to brown; blade of the banner suborbicular, 22–25 mm. high, 20–22 mm. broad, densely golden-strigillose on the back, the claw ca. 3 mm. long; wings ca. 28 mm. long, 6 mm. wide, auricled, the claw 4 mm. long; keel ca. 25–27 mm. long 7–10 mm. deep, auricled, the claw 4 mm. long. Staminal tube 19–21 mm. long, the vexillary stamen free at the base, with a conspicuous callosity on the upper side near the base. Ovary densely strigillose to short-strigose. Legumes nearly straight, somewhat narrowed and curved near the base, spreading, 7–10 cm. long, 5–7 mm. wide, densely hirsutulous with rusty-brown hairs, usually appearing finely velutinous; seeds 13–17, the mature seeds not seen.

Distribution. Presumably in oak woodland, apparently primarily at relatively low altitudes (600–700 m.), Sinaloa and Nayarit, Mexico. Map 18.

Specimens examined. MEXICO. Sinaloa: "Western Mexico", *Seemann* (GH) (probably *Tephrosia leucantha* of Seem. Bot. Voy. Herald. 280. 1856, not HBK., from Cerro de Pinal, Sinaloa, according to Riley, Kew Bull **1923:** 341. 1923); Picachos, Municipalidad Rosario, *Ortega 7139* (CAS, F, MEXU, US); Cordón de las Trompetas, Ixtagua, San Ignacio, 660 m., *Montes & Salazar 489*, 17 Aug. 1918 (US); Falda del C[erro] del

Perico, San Ignacio, 620 m., *Montes & Salazar 539*, 2 Sept. 1918 (US); Cerro del Perico, 620 m., El Limón, San Ignacio, *Ortega 394* (MEXU). NAYARIT: Between Pedro Paulo and San Blascito, *Rose 3336*, 4 Aug. 1897 (GH, MEXU, US; NY-photo); between Aguacata and Dolores, *Rose*, 6 Aug. 1897 (US).

29. **Tephrosia nitens** Benth. ex Seem.

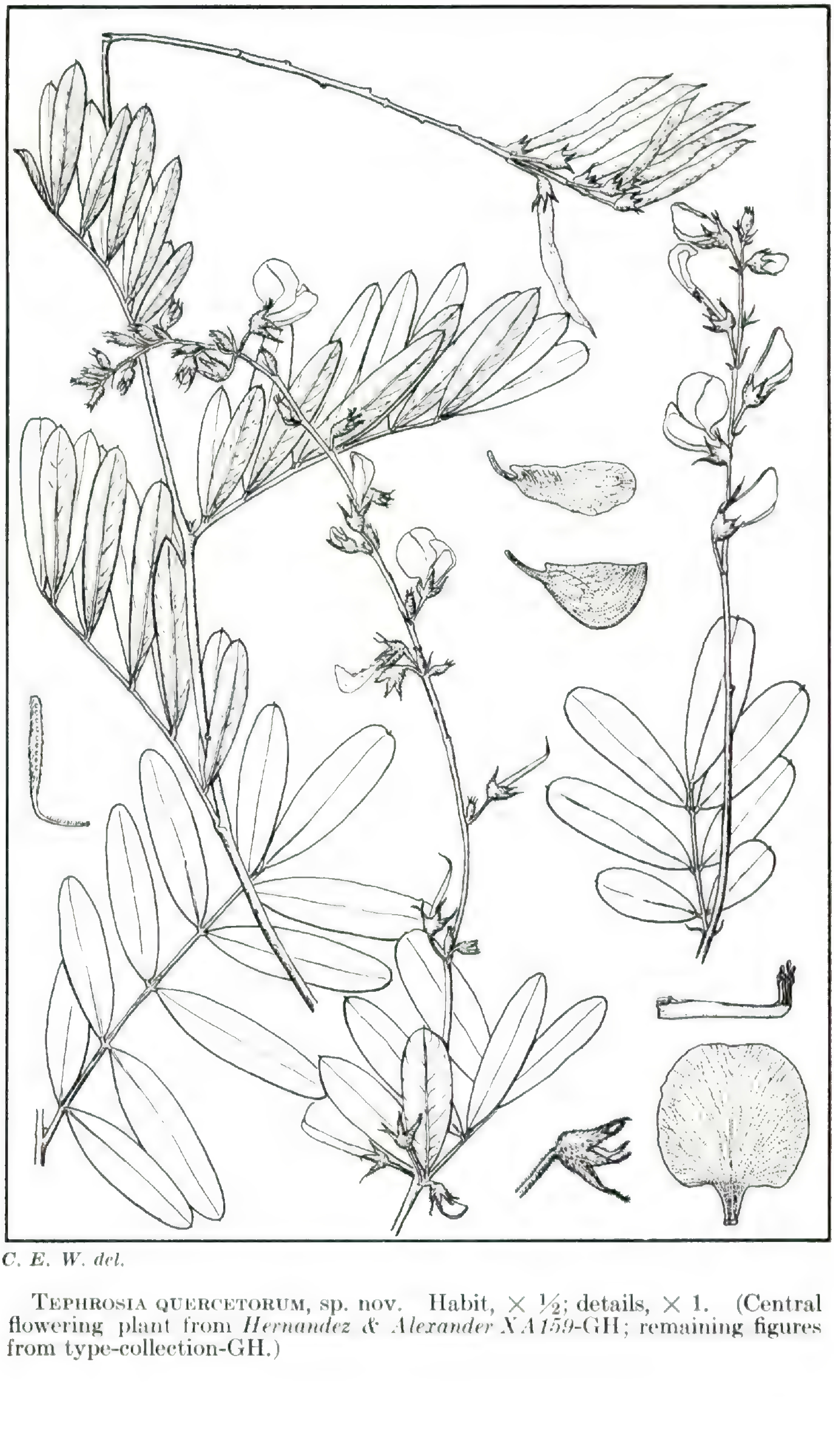
Tephrosia nitens Benth. ex Seem. Bot. Voy. Herald 107. 1853. Island of Taboga, Bay of Panama, Panama, *Seemann* (F-, NY-photograph of *Seemann 1036* at K).

Cracca nitens (Benth. ex Seem.) Kuntze, Rev. Gen. **1:** 175. 1891.

Tephrosia nitens var. *lanata* Micheli in Dur. & Pitt. Bull. Bot. Soc. Belg. **30**(1): 286. 1891. Cotypes collected in Costa Rica, "Terraba," *Pittier 3809*, Feb. 1891 and "savanes de Buenos Aires," *Pittier 3822* (F-fragment of *3809* ex Herb. Berol.; F-, GH-photograph of *3809* in Herb. Berol.; US-2 sheets of *Tonduz 3809*, "savanes des monts de Terraba," Feb. 1891, which may represent the same collection).

Tephrosia albida Brandeg. Univ. Calif. Publ. Bot. **10:** 406. 1924. Rocks along the road from Tuxtla Gutierrez to Jalisco, Chiapas, Mexico, *C. A. Purpus 9136*, Sept. 1923 (UC 220439-Type).

Erect herb from a woody crown, or a sparsely-branched shrub 3 m. high. Stems, petioles, rachises, petiolules and pedicels densely short-strigose to strigose or spreading-hirsute or villous with fine soft cinereous to tawny hairs up to 3 mm. long, appearing somewhat lanate. Leaves 2–15 cm. long, the petiole 2–5 mm. long, the rachis 1–6.5 cm. long, sometimes 2.5 mm. broad, deeply channeled on the upper side; stipules lanceolate to broadly ovate, acuminate, 6–12 mm. long, 2–6 mm. wide, sometimes persistent; leaflets of the principal leaves (1–)5–13, oblong-cuneate to oblanceolate or linear-oblong, rarely somewhat elliptic, the apex rounded, retuse or obtuse, mucronate, the base narrowed, (14–)18–80 mm. long, (5–)7.5–18(–23) mm. wide, 3–7 times as long as broad, the lowermost smallest, the terminal largest; leaflets coriaceous, yellowish-green, glabrous above, silky, densely strigose beneath with shining cinereous to golden hairs or with scattered long spreading hairs along the midrib and veins; veinlets between the main lateral veins running more or less parallel, forming elongate areoles between; petiolules 2–3 mm. long. Inflorescences terminal and axillary, ascending or erect, usually exceeding the leaves, the principal inflorescence terminal, 5–50 cm. long, the peduncle 3–7 cm. long, the uppermost 1–5 leaves sometimes with axillary flowers; axillary inflorescences slender, 5–25 cm. long; flowering nodes 5–ca. 50; buds 5–7 at a node, 4–5 flowering, 1–2 fruiting. Primary bracts lanceolate to ovate, acuminate, 5–13 mm. long, 2–4 mm. wide, deciduous; secondary bracts lanceolate to ovate-lanceolate, acuminate, 4–8 mm. long, deciduous. Pedicels 6–8 mm. long, ascending, ca. 1 mm. in diameter in fruit. Dried flowers 15–20 mm. long. Calyx 6–8 mm. long, densely hairy with appressed to spreading white hairs up to 3 mm. long, the upper lobes deltoid-subulate, 2–5 mm. long, the lateral deltoid-acuminate or lance-subulate,



C. E. W. del.

TEPHROSIA QUERCETORUM, sp. nov. Habit, × ½; details, × 1. (Central flowering plant from *Hernandez & Alexander XA159*-GH; remaining figures from type-collection-GH.)

C. E. W. del.

Tephrosia Abbottiae, sp. nov. Habit, × ½; details, × 1. Interior surface of opened calyx is seen at upper right; hairs on margins of lobes are omitted. (Inflorescence and details from Type-GH; large leaf from *Moore & Wood 4586*-GH.)

4–5 mm. long, the lowermost lanceolate-acuminate, 4–7 mm. long. Corolla rose or white, the banner with a greenish spot at the base; blade of the banner orbicular to subquadrate, 12–17 mm. high, 13–17 mm. wide, densely silky-hairy on the back, the claw 2–3 mm. long; wings oblong, 15–19 mm. long, 4–5 mm. wide, with or without an auricle, the claw 2.5–3 mm. long; keel 14–18 mm. long, slightly or not at all auricled, the claw 3–4 mm. long. Staminal tube 10–15 mm. long, the vexillary stamen coherent with the tube, free at the base, with a prominent thickening on the upper side near the base. Ovary densely strigillose or hirtellous with fine hairs. Legume (3.5–)4–6 cm. long, 4.5–5.5 mm. wide, usually slightly curved downward along its entire length, the tip often contracted evenly into the persistent style-base, legumes strongly ascending, hirtellous to strigillose with very fine white or tawny hairs; seeds 9–13, broadly oval in outline, light brown variegated with black, 3–3.4 mm. long, 2.4–2.8 mm. wide. Somatic chromosomes 22.

Distribution. Rocky ground, savannas and pinelands from sea level to 800 m., from Veracruz and Guerrero, Mexico, southward to Honduras, Costa Rica and Taboga Island in the Bay of Panama; Brazil; reported from Venezuela and Colombia. Map 18.

Specimens examined. MEXICO. Guerrero: La Botella, 500 m., (Dist. Galeana or Montes de Oca), *Langlassé 670* (GH, US); Plan de Carrizo, Dist. Galeana, 800 m., *Hinton 11037* (GH); Acapulco, *Hinds*, 1842 (GH). Oaxaca: *Mell 2279* (NY); Almoloya, 100–250 m., *Williams 9839* (F); Chivela, *Mell 41* (NY, US), *Orcutt 3301* (GH, US). Veracruz: Without definite locality, *Orcutt 3301* (F). Chiapas: Sabaña Palenque, *Matuda 3758* (A, F, NY); ridge back of Tonala, 1200–2500 ft., *Nelson 2880* (NY, US); road from Tuxtla Gutierrez to Jalisco, *Purpus 9136* (UC).

BRITISH HONDURAS. Belize: Near Manatee, *Gentle 3413* (A, MO, NY, US); Baker's Pine Ridge, *Lundell 6995* (F, NY). El Cayo: Mountain Pine Ridge, *Bartlett 11608* (NY); near Jenkins Creek, north of Monkey River, Toledo Dist., *Gentle 4064* (GH); pine ridge near Manatee Lagoon, *Peck 268* (GH).

GUATEMALA. Chiquimula: Road between Jocotán and Chiquimula, 600 m., *Steyermark 31747* (F).

HONDURAS. Cortés: San Pedro Sula, *Thième*, Feb. 1887 (US).

COSTA RICA. Cartago: San Rafael, *Pittier 6991* (US). Puntarenas: Buenos Aires, Cantón de Osa, 480 m., *Valerio 861* (F); Boruca, *Tonduz 4491* (US); Río Ceiba, 250 m., *Tonduz 4991* (US); monts de Terraba, 260 m., *Tonduz 3809* (US); Terraba, *Pittier*, Feb. 1891 (F-fragment; F-, GH-photo); El General, 700 m., *Pittier 12023* (US). San José?: El General, 825 m., *Skutch 2471*, *2472* (A, MO, NY, US).

PANAMA. Panamá: Taboga Island, Bay of Panama: *Seemann 1036* (F-, NY-photograph); *Standley 27999* (US); 0–250 m., *Pittier 3571* (NY, US); 300 m., *Killip 3174* (US); *Macbride 2830* (F, US); up to 300 m., *Allen 110* (GH, MO); 0–350 m., *Allen 1276* (GH, MO, US).

BRAZIL. Tropical Brazil, *Burchell 9231* (GH).

The two segregates from *Tephrosia nitens* represent normal variations of this well-marked species. The plant described as *T. nitens* var. *lanata* Micheli has 9 or 11 leaflets and blackish, lanate pubescence. The leaflet-number of the typical form of the species varies from 5 to 13, largely with the size of the plant, and the black color of the pubescence seems to be due to the progressive soiling of the long, fine hairs which often twist together late in the season.

Tephrosia albida Brandegee was said to differ in the length of the pedicels and in the "form and color of the corolla, "which, according to Brandegee, is "pallide purpurea," thus hardly contrasting significantly with the "fine rose-colour" described by Bentham. The type-specimen is well within the ordinary range of variation of *T. nitens* which seems to have been otherwise unrepresented in Brandegee's herbarium.

30. **Tephrosia hypoleuca** Riley

Tephrosia hypoleuca Riley, Kew Bull. **1923:** 339. 1923, not *Cracca hypoleuca* (Boiss.) Alef. 1861, or *C. hypoleuca* Rydb. 1923. "Sierra Madre," (Sinaloa, Durango or Nayarit, between the cities of Mazatlán and Durango or Durango and Tepic), Mexico, *Seemann 2192*, Nov. 1849–Feb. 1850 (K-Type).

Erect perennial, the base and roots unknown; stems sulcate, 3 mm. in diameter 3 dm. below the apex, monopodial. Stems, petioles, rachises, petiolules and pedicels densely strigillose to ascending-hirtellous with fine white or somewhat rusty hairs. Leaves 3.5–9.5 cm. long, the petioles 2–15 mm. long, the rachises 0–1.5 cm. long, deeply channeled on the upper side; stipules deciduous or easily broken; leaflets of the principal leaves 3–7, oblanceolate, acute or obtuse, a few slightly retuse, mucronulate, principally 2–7.5 cm. long, (5–)7–19 mm. wide, the terminal leaflet the largest; leaflets coriaceous, strigillose with very fine white hairs above when young, appearing somewhat canescent, becoming glabrous or nearly so and shining; leaflets densely white-strigillose below, dull to silky in appearance, the veins prominent; petiolules 2–4 mm. long. Inflorescences terminal or axillary, 3–9 cm. long, the peduncle 0.5–2 cm. long, the flowering nodes 5–10; buds ca. 5 or 6 at a node, 3–5 flowering. Primary bracts lanceolate, acuminate, 7–13 mm. long, 1.5–2 mm. wide, apparently deciduous, densely hirtellous; secondary bracts linear-lanceolate, up to 10 mm. long. Pedicels 5–11 mm. long, ascending, thickening to 1 mm. in fruit. Dried flowers 25–30 mm. long. Calyx campanulate, 8–9 mm. long, densely strigillose to ascending-hirtellous with fine white or (along the margins) rusty hairs, the upper lobes deltoid-acuminate, ca. 4 mm. long, the lateral and lowermost with deltoid bases, subulate, 6–7 mm. long. Corolla in dried specimen brownish with a tinge of lavender, the banner apparently with a

green spot near the base; banner 33 mm. long, the blade nearly orbicular, 28 mm. wide, emarginate at the apex, tapering into a narrow claw, densely appressed-hirtellous with golden hairs on the back; wings 29 mm. long, 14 mm. wide, the base of the blade truncate, not auricled, the slender claw 4 mm. long; keel scimitar-shaped, 29 mm. long, 11 mm. wide, the apex rounded, the base narrowed into a slender claw ca. 5 mm. long, exauriculate. Staminal tube 20 mm. long, the vexillary stamen apparently coherent with the tube, free at the base, with a prominent 3-lobed knob-like projection on the upper side near the base. Ovary 20 mm. long, appressed-hirtellous, the style 12 mm. long, barbate on the inner side. Legume curving slightly upward, ca. 8 cm. long, 6–7 mm. wide, compressed, densely hirsutulous with antrorsely directed rusty and white hairs, the overall effect rusty; seeds 12–13, the mature seeds unknown.

Distribution. Southern Sinaloa and probably adjacent Nayarit, Mexico.

Specimens examined. MEXICO. Sinaloa: Quebrada, Municipalidad Concordia, 1500 m., *M. P. Dehesa 1559*, Sept. 1919 (K, US), *Ortega 287* (MEXU). Sinaloa, Durango or Nayarit: Sierra Madre, *Seemann 2192* (K).

Although poorly known, *Tephrosia hypoleuca* is a handsome, distinctive species with 3–7 oblanceolate, coriaceous leaflets, large flowers and deltoid calyx-lobes. It should not be confused with *Cracca hypoleuca* Rydb. (1923), based on *Indigofera Perriniana* Spreng. (1821). The latter plant is a *Tephrosia* of the glabrous-styled series and seems to represent, moreover, only a casual introduction of the African species, **T. linearis* (Willd.) Pers., into the West Indies, where it has not been recollected.

31. **Tephrosia vernicosa** sp. nov.

Planta perennis herbacea vel suffruticosa, 3–5 dm. alta. Folia 4–9 cm. longa; petioli (2–)5–10 mm. longi; stipulae lineari-acuminatae deciduae, 8–10 mm. longae, 1–1.5 mm. latae; foliola foliorum praecipuorum 5–9, angustato-lanceolata, medio latissima, vel leviter oblanceolata, basi et apice acuta, mucronata, foliola superiora folii (23–)35–62 mm. longa, (7–)9–14 mm. lata, inferiora 20–42 mm. longa, 6–10 mm. lata; foliola tenuia firma, supra vernicosa, glabra vel nervus primarius breve strigosus, subtus dense strigillosa pilis cinereis nitidis. Inflorescentiae praecipuae terminales compactae subcapitatae, 2–3 cm. longae, pedunculis 5–7 mm. longis; nodi floriferi circa 6–8, alabastra circa 5 per nodum. Bracteae primariae lineari-lanceolatae, acuminatae, 8–11 mm. longae, 1.5 mm. latae, deciduae. Pedicelli 8 mm. longi, densissime hirsuti vel villosi. Calyx circa 12 mm. longus densissime hirsutus vel villosus pilis cinereis vel ferruginosis; lobi laterales et lobus infimus ovato-deltoidei, abrupte acuminati, attenuati; lobi superiores 6–7 mm. longi, lobi laterales 7–8 mm. longi, lobus infimus 6–7 mm. longus. Lamina vexilli suborbicularis, 15–16 mm. alta lataque, ungue 5 mm. longo; alae 15 mm. longae, 5 mm. latae, leviter auriculatae, ungue 4 mm. longo; carina 13 mm. longa, 8 mm. profunda, auriculata, ungue 4 mm. longo. Tubus staminalis circa 13 mm. longus; stamen vexillare tubo connatum, basi liberum. Ovarium dense strigosum; ovulae 7; stylus barbatus. Legumen seminaque incognita.

Erect herbaceous or suffruticose perennial, 3–5 dm. high, from a woody crown and root; stems terete below, somewhat ridged and sulcate above. Stems, petioles, rachises and axes of inflorescences densely strigillose and with longer ascending cinereous and/or tawny hairs. Leaves 4–9 cm. long, the petioles (2–)5–10 mm. long, much shorter than the lowermost leaflets, the rachis 1–2.5 cm. long; stipules linear, acuminate, deciduous or easily broken, 8–10 mm. long, 1–1.5 mm. wide; leaflets of the principal leaves 5–9, narrowly lanceolate, tapering to both ends or slightly oblanceolate, the base acute or cuneate, usually narrower than the acute apex, mucronate, the upper leaflets (23–)35–62 mm. long, (7–)9–14 mm. wide, (3–)4–5 times as long as broad, the basal pairs 20–42 mm. long, 6–10 mm. wide, 3–4 times as long as broad; leaflets thin but rigid, shining as though varnished, glabrous except the short-strigose impressed midrib, at length glabrate above, densely strigillose below with lustrous cinereous or (along the midrib) rusty hairs; petiolules 1–1.5 mm. long. Inflorescences principally terminal, very compact, almost capitate, 2–3 cm. long, the peduncle 5–7 mm. long, the flowering nodes crowded, probably 6–8, short poorly-developed axillary inflorescences 1–3 cm. long sometimes present in the upper axils; buds ca. 5 at a node, ca. 3 flowering. Primary bracts linear-lanceolate, long-acuminate, 8–11 mm. long, 1.5 mm. wide, deciduous; secondary bracts linear-attenuate, ca. 6–8 mm. long. Pedicels ca. 8 mm. long, ascending. Dried flower 18 mm. long. Pedicels, calyx and bracts very densely hirsute to villous with soft cinereous or (near the ends of the calyx lobes) rusty hairs. Calyx ca. 12 mm. long, the lateral and lowermost lobes deltoid-ovate at the base, abruptly narrowed and long-attenuate, the upper lobes 6–7 mm. long, the lateral and lowermost 7–8 mm. long, ca. 2.5 mm. broad at the base. Corolla color unknown, pinkish-brown in dried specimen; blade of the banner suborbicular, 15–16 mm. high, 15–16 mm. broad, tapering into a claw 5 mm. long, the blade hirsute or villous on the back with fine silky rusty and cinereous hairs, wings ca. 15 mm. long, 5 mm. broad, slightly auriculate, the claw 4 mm. long; keel 13 mm. long, 8 mm. deep, auriculate, the claw 4 mm. long. Staminal tube ca. 13 mm. long, the vexillary stamen coherent with the tube, free at the base, with a prominent 2-lobed callosity on the upper side near the base. Ovary densely strigose, the style barbate, ovules 7. Legume and seeds unknown. FIG. 4, PLATE 1153.

DISTRIBUTION. Known only from the type-locality. Map 16.

SPECIMENS EXAMINED. MEXICO. GUERRERO: "Shrub, 30 cm., local, pine forest," Laguna–Tequeches, 1950 m., Dist. Mina, *G. B. Hinton 9950*, 3 Dec. 1936 (NY-Type; GH, UC).

Although it is known from only a single collection, *Tephrosia vernicosa* is so completely distinct that it is not likely to be confused with any other American species. The 5–9 lanceolate leaflets tapering to both ends, the upper surfaces shining as though varnished and the lower surfaces densely strigillose, the

much-condensed, congested inflorescences, and the characteristic hirsute or villous calyx with attenuate lobes 6–8 mm. long immediately differentiate it. The legume and seeds are unknown, but the few ovules (7 in the single ovary available for dissection) indicate that additional diagnostic characters may perhaps be found there.

The calyx and congested inflorescences suggest *Tephrosia pogonocalyx,* another new species also known only from a single collection, but the vegetative characters of that plant are quite different. The leaflets in shape and number approach most nearly *T. hypoleuca* of Sinaloa but the resemblance is otherwise not very striking, the flowers being very dissimilar.

The Sierra Madre of Guerrero south of the Río Balsas, from which this new species comes, seems to have been almost untouched except for the collections made by Langlassé, Nelson and Hinton. Nevertheless, eleven species of *Tephrosia* are already known from this area which shares with northern Guerrero, adjacent Morelos and México a total of 17 species, indicating that this region is one of the important centers of diversification of the genus.

32. **Tephrosia pogonocalyx** sp. nov.

Planta perennis erecta herbacea(?), 1 m. alta, undique hirtella vel hirsutula. Folia praecipua 7–13.5 cm. longa; petioli 1–17 mm. longi; stipulae deciduae; foliola foliorum praecipuorum 5–13, elliptica vel angustato-elliptica, basi et apice rotundata vel acuta, 22–43 mm. longa, 11–18 mm. lata, tenuia, supra hirtella vel hirsutula pilis fulvis, subtus hirsutula pilis cinereis, venis conspicuis. Inflorescentia "paniculata," circa 25 cm. longa, nodi floriferi ramorum 3–15, conferti, alabastra circa 4–5 per nodum. Bracteae primariae angustae prope subulatae, attenuatae, 6–11 mm. longae, deciduae; bracteae secundariae lineari-acuminatae, 5–6 mm. longae, deciduae. Pedicelli circa 8 mm. longi, hirsuti vel hirsutuli. Calyx campanulatus 10–12 mm. longus, hirtus vel hirsutulus pilis ferruginosis vel fulvis divaricatis; lobi superiores deltoidei attenuati, 5–7 mm. longi; lobi laterales lanceolati acuminati attenuati, 6–7 mm. longi; lobus infimus 7–9 mm. longus; bracteolae 1 vel 2, lineari-setaceae, circa 5 mm. longae, hirsutae vel hirsutulae. Corolla roseo-purpurea (?); vexillum basi macula viridia, lamina suborbicularis, 15 mm. alta, 16 mm. lata, extus hirsutula; alae 16–17 mm. longae, 6 mm. latae, auriculatae, ungue 3–4 mm. longo; carina 17 mm. longa, ungue 3–4 mm. longo. Tubus staminalis 13–14 mm. longus; stamen vexillare tubo connatum, basi liberum. Ovarium dense strigosum, 9-ovulatum; stylus barbatus. Legumen immaturum hirsutum pilis fulvis.

Erect herbaceous(?) perennial, 1 m. high; stems nearly terete or somewhat angular, striate. Stems, petioles, rachises and axes of inflorescences densely hirtellous to hirsutulous with tawny or cinereous spreading hairs. Principal leaves 7–13.5 cm. long, much reduced in size at the inflorescence,

2–7 cm. long, the petioles 1–17 mm. long, the rachis 3–9.5 cm. long; stipules deciduous; leaflets of the principal leaves 5–13, elliptic or narrowly so, the base and apex either rounded or acute, the apex mucronate, 22–43 mm. long, 11–18 mm. wide, 2–3 times as long as broad, the leaflets of the uppermost leaves (subtending axillary inflorescences) (5–)9–35 mm. long, (2–)5–10 mm. wide, 2–3 times as long as broad; leaflets thin, evenly hirtellous or hirsutulous above with short tawny hairs, moderately hirsutulous below with ascending cinereous hairs, the veins conspicuous on both surfaces; petiolules 1–2 mm. long. Inflorescence "paniculate", composed of a crowded terminal inflorescence with 3–4 short branches 2–3 cm. long from the axils of the upper leaves, the axillary inflorescences reduced in size upward, the longest ca. 13 cm., the flowering portion of the plant ca. 25 cm. long, the flowering nodes 3–15 per branch of the inflorescence, crowded; buds 4–5 at a node. Primary bracts very narrow, almost subulate, attenuate, 6–11 mm. long, deciduous. Pedicels ca. 8 mm. long, ascending. Dried flowers ca. 20 mm. long. Bracts, pedicels, calyx and bracteoles densely hirsute or hirsutulous with spreading rusty or tawny hairs. Calyx campanulate, 10–12 mm. long, with 1 or 2 linear-setaceous bracteoles ca. 5 mm. long at the base or on the pedicel, the upper lobes of the calyx deltoid, attenuate, 5–7 mm. long, the lateral and lowermost lanceolate, long-acuminate, attenuate, 6–7 mm. long and 7–9 mm. long, respectively. Corolla apparently rose-purple with a green spot at the base of the blade of the banner; blade of the banner subquadrate or suborbicular, 15 mm. high, 16 mm. broad, hirsutulous with rusty hairs on the back, with a broad claw 4 mm. long; wings 16–17 mm. long, ca. 6 mm. wide, auriculate, the claw 3–4 mm. long; keel 17 mm. long, 7–8 mm. deep, slightly auriculate, the claw 3–4 mm. long. Staminal tube 13–14 mm. long, the vexillary stamen coherent with the tube, free at the base, with a callosity on the upper side near the base. Ovary densely strigose, the style barbate; ovules 9. Very immature legume hirsute with tawny hairs, the mature legume and seeds unknown. Fig. 3, Plate 1153.

Distribution. Known only from the type-locality. Map 21.

Specimens examined. MEXICO. México: "One meter high," oak woods, Nanchititla, Dist. Temascaltepec, *G. B. Hinton 3101*, 6 Jan. 1933 (GH-Type; NY).

The densely hirsute calyces brought close together in the rather congested inflorescences suggest *Tephrosia vernicosa*, but this plant is abundantly distinct from that species in its 5–13 membranous, elliptic or narrowly elliptic leaflets and in the presence of bracteoles on pedicels or calyces. Although the single collection leaves much to be desired, this species is so clearly marked by calyces, leaflets, deciduous bracts, crowded inflorescences, and bracteoles that I do not hesitate to describe it.

33. **Tephrosia belizensis** Lundell

Tephrosia chrysophylla Mart. & Gal. Bull. Acad. Brux. **10**(2): 49. 1843, not Pursh, 1814. "On trouve cette Tephrosie dans les savanes a malpighiacées de Zacuapan et de Mirador, à 3000 pieds,"[1] Veracruz, Mexico, *H. Galeotti 3326* (F-leaflet of isotype ex Herb. Mus. Paris.).

Tephrosia belizensis Lundell, Bull. Torr. Club. **64:** 550. 1937. Open rocky bank of Río Frio near San Agustin, Mountain Pine Ridge, El Cayo Dist., British Honduras, *C. L. Lundell 6662*, 29 July 1936 (NY, US).

Slender erect herbaceous or suffrutescent perennial 0.4–2 m. high. Stems, petioles, rachises and axes of the inflorescences strigillose to hirtellous with rusty or cinereous hairs, occasionally with scattered longer hairs. Leaves ascending or spreading, principally 8–24 cm. long, sessile or with petioles only 1–3 mm. long, the rachis 3.5–15 cm. long; stipules linear-subulate, 5–6 mm. long, ca. 1 mm. wide, deciduous; leaflets 5–19, the upper pairs lanceolate or ovate-lanceolate, 2–7.5 cm. long, 0.7–2.5 cm. wide, the apex acute, acuminate, blunt or slightly retuse, mucronate, the base obtuse or rounded, the lowermost pair of leaflets much reduced, suborbicular to oval or ovate, 1–2.5 cm. long, 0.8–1.5 cm. broad, the two lowermost pairs of leaflets usually crowded; leaflets glabrous, dark green and shining, estomatiferous above, moderately to densely strigillose to short-strigose beneath with silvery or golden hairs, silky, shining; petiolules (1–)2–4 mm. long, densely strigillose to hirtellous. Principal inflorescences terminal or 1 or 2 from the upper axils, leafless, lax, slender, the terminal 10–30 cm. long, often with 1–5 branches 10–20 cm. long from the axils of bracts, the peduncle 4–9 cm. long, the flowering nodes 5–32; buds 5–7 at a node, 3–5 flowering, 1 or 2 fruiting. Primary bracts linear-lanceolate, 5–10 mm. long, deciduous before anthesis. Pedicels 6–9 mm. long, ascending, thickening in fruit, hirtellous with rusty hairs. Dried flowers 13–17 mm. long. Calyx ca. 5 mm. long, hirtellous to strigillose with rusty hairs, the lobes linear-lanceolate to lanceolate, the upper 2 mm. long, the lateral 3–4 mm. long, the lowermost 4–5 mm. long. Corolla apparently lavender or magenta; blade of the banner suborbicular, ca. 14 mm. broad, densely hairy on the back, the claw ca. 3 mm. long; wings 15–17 mm. long, 5–6 mm. wide, the claw ca. 2.5 mm. long; keel ca. 15 mm. long, 6 mm. deep, slightly auricled at the base and beaked at the distal end, the claw 3.5 mm. long. Staminal tube ca. 14 mm. long, the vexillary stamen connate with the tube, free at the base, somewhat thickened on the upper side near the base. Ovary densely strigillose; ovules 9–10. Legumes straight or slightly curved downward near the base, short-beaked, 5–7 cm. long, 6–7 mm. wide, ascending or spreading, hirtellous or sometimes hirsutulous with rusty hairs; seeds 8–10, 3.6–4.2 mm. long, 2.8–3.2 mm. broad, brown to gray, lightly variegated with black. Somatic chromosomes 22. Flowering collections from February to March.

[1] According to Allen (1945, p. 281) Zacuapán is the modern village of Axouacapán. This seems to be a misspelling of Axocuápam or Axocuapan which lies north of Huatusco and approximately 11 km. west of Mirador.

Distribution. Pine and oak forests (20–1000 m.?) from Veracruz to Oaxaca and Chiapas, Mexico, and British Honduras. Map 24.

Specimens examined. MEXICO. Veracruz: Mirador or Zacuapán, *Galeotti 3326* (F-fragment); Zacuapán, *Purpus 16360a*, Mar. 1934 (F); rocky oak forests, Zacuapán, *Purpus 16460*, Apr. 1935 (K); Fortín, *Purpus 8679* (US); Matlaluca, *Liebmann 4650* (part), Jan. 1843 (UC). Oaxaca: Shrub in llanos, Chiltepec and vicinity, 20. m., Dist. Tuxtepec, *Martinez-Calderón 386* (A, MEXU, US); shrub up to 3 ft., oak forests near San José Chiltepec, 100 m., 17° 58′ N, 96° 10′ W, *Schultes & Reko 552*, 10 Apr. 1939 (GH). Chiapas: Under oaks, below Finca Liquidambar toward Palestina, 3000 ft., *Hernandez X. & Sharp X379*, 8 Nov. 1945 (GH).

BRITISH HONDURAS. El Cayo: Erect suffrutescent plant, 40–75 cm., open rocky bank of Río Frio, San Agustin, Mountain Pine Ridge, *Lundell 6662*, July–Aug. 1936 (NY, US); edge of ravine, Mountain Pine Ridge, *Bartlett 11588*, 20 Feb. 1931 (US).

34. **Tephrosia mexicana** sp. nov.

Planta perennis erecta herbacea(?), 6 dm. alta. Caules subflexuosi, hirtelli vel strigillosi pilis fulvis vel ferruginosis. Folia (4–)6–11 cm. longa, petioli 3–10 mm. longi; stipulae lineari-subulatae, 7–8 mm. longae, deciduae; foliola 7–13, superiora lanceolata vel oblongo-lanceolata, apice acuta, mucronata, basi rotundata, 35–65 mm. longa, 9–19 mm. lata, terminale maximum; inferiora minima, elliptica vel lanceolato-ovata, 18–32 mm. longa, 8–15 mm. lata; foliola tenuia, venis conspicuis, supra leviter nitida hirtella vel strigillosa, subtus pallidiora, dense strigillosa vel breve strigosa pilis cinereis. Inflorescentiae terminales et axillares, 8–25 cm. longae, graciles laxae ascendentes, pedunculis 4–6 cm. longis; nodi floriferi 10–35, alabastra circa 3–5 per nodum. Bracteae primariae lineari-subulatae angustatae, 5–6 mm. longae, deciduae; bracteae secundariae 3–4 mm. longae, deciduae. Pedicelli 5–7 mm. longi, graciles, hirtelli vel hirsutuli pilis cinereis. Calyx 4–6 mm. longus, hirtellus vel hirsutulus pilis cinereis vel (lobis) ferruginosis quam 1 mm. brevibus; lobi superiores setacei, 1–2 mm. longi; lobi laterales deltoidei vel ovato-deltoidei, abrupte acuminati, 2.5–3.5 mm. longi, basi 2–2.5 mm. lati; lobus infimus deltoideus vel ovato-deltoideus abrupte acuminatus, 3–4 mm. longus. Corolla roseo-purpurea(?); vexillum basi macula viridia, lamina suborbicularis, 12–13 mm. alta et lata, extus strigillosa pilis ferruginosis; alae 15–16 mm. longae, 5 mm. latae, ungue 3–4 mm. longo; carina 14–16 mm. longa, 5–6 mm. profunda, ungue 3–4 mm. longo. Tubus staminalis 12–13 mm. longus; stamen vexillare tubo connatum, basi liberum. Ovarium dense brevique strigosum; ovulae 6–8. Legumen immaturum hirsutulum pilis fulvis.

Erect herbaceous(?) perennial, at least 6 dm. high; stems terete or somewhat angular, striate, somewhat flexuous. Stems, petioles, rachises and axes of inflorescences moderately to densely hirtellous or strigillose with tawny or rusty hairs. Leaves (4–)6–11 cm. long, the petioles 3–10 mm. long, the rachises (1.5–)4–6 cm. long; stipules linear-subulate, very narrow (0.5–0.7 mm.), 7–8 mm. long, deciduous; leaflets 7–13, the distal pairs lanceolate to oblong-lanceolate, the apex usually acute, mucronate, the base rounded, 35–65 mm. long, 9–19 mm. wide, 3.5–4 times as long as broad, the terminal leaflet largest, the proximal pair of leaflets smallest, elliptic or lance-ovate, 18–32 mm. long, 8–15 mm. wide, 2 times as long as

broad; leaflets thin, the veins conspicuous, slightly lustrous, moderately and evenly hirtellous or strigillose above, paler below, moderately to densely strigillose or short-strigose with lustrous cinereous or (along the veins) rusty hairs, silky; petiolules 1.5–2 mm. long. Inflorescences terminal and axillary, often with 1 or 2 branches from the axils of bracts, or the axillary inflorescences occasionally 2 from the axil of a leaf; inflorescences 8–25 cm. long, the branches 2–10 cm. long, slender, wand-like, curving upward, lax, the 10–35 flowering nodes usually well separated, the peduncles 4–6 cm. long; buds 3–5 at a node, 2 or 3 flowering. Primary bracts linear-subulate, narrow, 5–6 mm. long, ca. 0.5–1 mm. wide, deciduous before anthesis, secondary bracts 3–4 mm. long, deciduous. Pedicels 5–7 mm. long, slender. Dried flowers 13–15 mm. long. Calyx and pedicels hirtellous to hirsutulous with cinereous or (on the calyx-lobes) rusty hairs less than 1 mm. long. Calyx 4–6 mm. long, the upper lobes setaceous, 1–2 mm. long, the lateral and lowermost deltoid or deltoid-ovate, abruptly acuminate, 2–2.5 mm. wide at the base, 2.5–3.5 mm. long and 3–4 mm. long, respectively. Flowers apparently rose-purple, the banner with a green spot at the base; blade of the banner suborbicular, 12–13 mm. high and broad, strigillose with rusty hairs on the back, the claw 3 mm. long; wings 15–16 mm. long, 5 mm. broad, the claw 3–4 mm. long; keel 14–16 mm. long, 5–6 mm. deep, the claw 3–4 mm. long. Staminal tube 12–13 mm. long, the vexillary stamen coherent with the tube, free at the base, with a 2-lobed callosity on the upper side near the base. Ovary densely short-strigose or hirsutulous, the style barbate; ovules 6–8. Mature legume and seeds unknown, the very immature fruit hirsutulous with tawny hairs. Fig. 2, Plate 1153.

Distribution. Known only from the type-locality. Map 24.

Specimens examined. MEXICO. México: Oak woods, Cumbre de Tejupilco, 2000 m., Dist. Temascaltepec, *G. B. Hinton 2698*, 24 Nov. 1932 (GH-Type; NY, UC).

Tephrosia mexicana is reminiscent of *T. belizensis*, a plant of Veracruz, Oaxaca, Chiapas and British Honduras. In addition to their apparent isolation from each other on opposite sides of the Central Plateau, the two species differ in a number of morphological particulars outlined in the accompanying table (p. 346).

35. **Tephrosia Langlassei** Micheli

Tephrosia Langlassei Micheli, Mem. Soc. Phys. et Hist. Nat. Genève **34:** 250. pl. 3. 1903. "Plante de 50 cm., fleurs rouge violet," Sierra Madre, 1750 m., Guerrero, Mexico, *E. Langlassé 798*, Jan. 1899 (GH, US). (Apparently collected in the mountains north of and between Coyuquilla and Nuxco, Dist. Galeana; see discussion under *T. major*.)

Cracca Langlassei (Micheli) Rose, Contr. U. S. Nat. Herb. **12:** 270. 1909.

Erect herbaceous or somewhat suffrutescent perennial, 2.5–5 dm. or more high, branching monopodially. Stems petioles, rachises, petiolules

and axes of inflorescences sparsely to densely hirsute or villous with golden or rusty, spreading or somewhat recurving hairs, not doubly pubescent. Principal leaves 6–20 cm. long, sessile or with petioles to 25 mm. long, the rachis 2–11 cm. long; stipules linear-lanceolate to linear, acuminate, 12–13 mm. long, usually persistent, green becoming brown; leaflets of the principal leaves 5–11, lanceolate to ovate-lanceolate, elliptic-lanceolate or oblong-lanceolate, the base rounded, the apex acuminate or occasionally acute, tipped by the slender excurrent midrib, 1.3–8.5 cm. long, 0.8–2 cm.

	T. mexicana	*T. belizensis*
Petioles	3–10 mm. long.	0–3 mm. long.
Leaflets	7–13, the lowermost pair elliptic or lance-ovate, 18–32 mm. long, 8–15 mm. wide, the 2 lowermost pairs not crowded; leaflets hirtellous or hirsutulous above.	5–19, the lowermost pair suborbicular to oval or ovate, 10–25 mm. long, 7–15 mm. wide, the two lowermost pairs crowded; leaflets glabrous above.
Primary bracts	Linear-subulate, 5–6 mm. long.	Linear-lanceolate, 5–10 mm. long.
Calyx	Upper lobes setaceous, 1–2 mm. long, lateral and lowermost lobes deltoid or deltoid ovate, abruptly acuminate, 2.5–3.5 mm. and 3–4 mm. long, respectively.	Lobes linear-lanceolate to lanceolate, 2 mm., 3–4 mm., and 4–5 mm. long, respectively.
Ovules	6–8	9–10

wide, the lowermost leaflets usually smallest; leaflets thin, usually almost membranous, dark green above, paler beneath, the veins evident, the upper epidermis usually stomatiferous, hirsutulous, the lower surface moderately to densely hirsutulous or hirsute with spreading cinereous or golden hairs; petiolules 1–2 mm. long, slender. Inflorescences terminal and axillary (the latter often 2 from an axil), usually lax, slender, ascending, 4–35 cm. long, leafless or the lowermost node with a leaf, the peduncle 2–10 cm. long, the axis angled, sulcate or striate, the flowering nodes 3–20; buds 3–5 at a node, usually 3 flowering. Primary bracts linear-lanceolate or linear, long-acuminate, 7–18 mm. long, usually green, persistent, 5-veined; secondary bracts linear to linear-setaceous, long-acuminate, 6–13 mm. long, often persistent. Pedicels slender, almost filiform, 10–13 mm. long, scarcely thickening in fruit. Dried flowers 13–15 mm. long. Calyx campanulate, 8–9 mm. long, hirtellous with very fine whitish hairs and hirsute or villous with golden or rusty hairs, the lobes deltoid at the base, subulate-attenuate, the upper lobes 5 mm. long, the lateral 5–6 mm. long, the lowermost 7–7.5 mm. long. Corolla pink or purplish when dry, the banner with a green spot at the base; blade of the banner suborbicular, 12–14 mm. high, 12–13 mm. broad, strigillose or short-strigose on the back

with fine silky hairs, the claw 2–3 mm. long; wings 14–15 mm. long, ca. 6 mm. wide, slightly auricled, the claw 3 mm. long; keel 13–15 mm. long, exauriculate, the claw 3–3.5 mm. long. Staminal tube 10–12 mm. long, the vexillary stamen coherent with the tube, free at the base, with a prominent callosity on the upper side. Ovary strigose with fine soft hairs; ovules 6 or 7. Legume 4–5 cm. long, 6–7 mm. broad, flat, hirsutulous to hirsute with spreading golden or rusty hairs, horizontal or ascending; seeds 5–7, the mature seeds not seen. Flowering collections from January to April.

Distribution. Rocky slopes and pineland, 1300–1750 m., Veracruz, Guerrero, Oaxaca and Chiapas, Mexico. Map 17.[1]

Specimens examined. MEXICO. Veracruz: Hillsides, Tecomatla, *Purpus 10028*, Apr. 1927 (F); rare, on moist rocks, barrancas near Tecomatla, *Purpus 10106*, 25 Feb. (US); very rare, rocky slopes, barranca near Tecomatla, *Purpus 10508*, Oct. (US); Tecomatla, *Purpus* (US); rocky hillsides near Tecomatla, *Purpus 10528*, Oct (UC); Matlaluca, *Liebmann 4650*, Jan. 1843 (US). Oaxaca: Between Juquila and Nopala, Dist. Juquila, 4000–17000 [7000?] ft., *E. Nelson 2419*, 4 Mar. 1895 (US); between Santa Cruz and Teutila, Dist. Cuicatlán, 1300 m., *Conzatti 3550*, 20 Apr. 1919 (US). Guerrero: Sierra Madre, 1750 m., [apparently Dist. Galeana; see synonymy above], *Langlassé 798*, Jan. 1899 (GH, US). Chiapas: Pineland, Montecristo, *Matuda 1975*, Jan. 1938 (A, F, NY, US).

Tephrosia Langlassei is discussed with the following species.

36. **Tephrosia simulans** sp. nov.

Planta *Tephrosiae Langlassei* affinis perennis erecta herbacea vel suffrutescens, 0.2–2.5 m. alta, undique strigillosa, hirtella vel hirsutula pilis aureis vel cinereis quam 1 mm. brevioribus. Folia praecipua 5–13 cm. longa; stipulae lineari-acuminatae vel lineari-setaceae, 5–7 mm. longae, plerumque deciduae; foliola 5–11, lanceolato-ovata, lanceolata, elliptico-lanceolata, oblongo-lanceolata vel fere elliptica, basi rotundata vel obtusa, apice plerumque acuta vel rotundata, longiuscule mucronata, terminale (2.2–)3–7 cm. longum, (0.7–)1–3 cm. latum, inferiora (1–)1.5–5.5 cm. longa, (0.6–)1–2.5 cm. lata, coriacea, venis conspicuis, supra viridia, nitida, estomatifera, hirtella, subtus pallidiora, hirsutula pilis mollibus cinereis vel aliquando aureis. Inflorescentiae terminales vel axillares, 4–30 cm. longae, erectae vel ascendentes, plerumque efoliatae, pedunculis 2–9 cm. longis; nodi floriferi 3–20. Bracteae primariae lineari-lanceolatae vel lineari-subulatae, plerumque brunneae et deciduae; bracteae secundariae lineari-setaceae, 3–5 mm. longae, deciduae. Pedicelli 7–14 mm. longi. Calyx campanulatus 5.5–7 mm. longus, hirtellus vel hirtellus et hirsutulus vel strigillosus et breve strigosus pilis cinereis, ferruginosis vel atrobrunneis, lobi basi deltoidei vel ovato-deltoidei, acuminati vel subulati, lobi superiores 3–4 mm. longi, lobi laterales 3.5–5(–6) mm. longi, lobus infimus 3.5–5.5(–7) mm. longus. Corolla lilacina; vexillum basi macula viridia, lamina suborbicularis, 12–15 mm. alta et lata; alae 13–16 mm. longae, exauriculatae, ungue 2–2.5 mm. longo; carina 14–15 mm. longa, exauriculata, ungue 2–3 mm. longo. Tubus staminalis 10–12 mm. longus; stamen vexillare tubo connatum, basi liberum. Ovarium dense brevique strigosum, 6–7-

[1] Since Map 17 was drawn the westernmost dot for this species (accompanied by "?") has been located more definitely and should be moved southeastward to Dist. Galeana, Guerrero. See synonymy above and discussion under *Tephrosia major*.

ovulatum; stylus barbatus. Legumen fere maturum 4.5–5 cm. longum, 5–5.5 mm. latum, hirsutulum vel hirsutum pilis cinereis, ferruginosis vel atrobrunneis, semina 6–7; semina immatura circa 4 mm. longa, 2.6 mm. lata.

Erect herbaceous or suffrutescent perennial, 0.2–2.5 m. high, from a woody root; stems terete, striate and purplish below, somewhat angled above, branching monopodially. Stems, petioles, rachises, petiolules and axes of the inflorescences strigillose or hirtellous to hirsutulous with golden or cinereous hairs less than 1 mm. long. Principal leaves 5–13 cm. long, sessile or with petioles up to 15 mm. long, the rachis 2–7 cm. long; stipules linear, acuminate, to linear-setaceous, 5–7 mm. long, brown, usually deciduous; leaflets of the principal leaves 5–11, lanceolate-ovate, to lanceolate, elliptic-lanceolate, oblong-lanceolate or nearly elliptic, the base usually rounded or obtuse, the apex acute or rounded, rarely acuminate, tipped by the slender excurrent midrib, the terminal leaflet largest, (2.2–) 3–7 cm. long, (0.7–)1–3 cm. wide, the lateral leaflets (1–)1.5–5.5 cm. long, (0.6–)1–2.5 cm. wide; leaflets coriaceous, shining, dark green above, paler below, the veins prominent, often somewhat impressed above, the upper epidermis estomatiferous, hirtellous, the lower surface hirsutulous with soft cinereous or occasionally golden hairs, often appearing pilose; petiolules 1–2 mm. long. Inflorescences terminal and axillary, the latter often 2 from an axil, 4–30 cm. long, ascending, somewhat lax, leafless or 1 or 2 nodes with a leaf, the peduncle 2–9 cm. long, the flowering nodes 3–20; buds 3–5 at a node, 1–3 flowering. Primary bracts linear-lanceolate to linear-subulate, 5–8 mm. long, usually brown and deciduous; secondary bracts linear-setaceous, 3–5 mm. long, deciduous. Pedicels 7–14 mm. long, usually stouter than in *T. Langlassei*. Dried flowers 14–18 mm. long. Calyx campanulate, 5.5–7 mm. long, hirtellous or both hirtellous and hirsutulous or strigillose and short-strigose with whitish, rusty or dark-brown hairs, the lobes deltoid or ovate-deltoid at the base, acuminate to subulate, the upper 3–4 mm. long, the lateral 3.5–5(–6) mm. long, the lowermost 3.5–5.5(–7) mm. long. Corolla "lilac-purple" (Mexia), the banner with a green spot at the base within; blade of the banner nearly orbicular, 12–15 mm. high and broad, strigillose or short-strigose on the back with fine silky hairs, the claw 2.5–3.5 mm. long; wings 13–16 mm. long, 4.5–5.5 mm. wide, scarcely auricled, the claw 2–2.5 mm. long; keel 14–15 mm. long, exauriculate, the claw 2–3 mm. long. Staminal tube 10–12 mm. long, the vexillary stamen coherent with the tube, free at the base, with a prominent callosity on the upper side near the base. Ovary short-strigose with fine hairs, the style barbate; ovules 6–7. Legume nearly straight, 4.5–5.5 cm. long, 5–5.5 mm. wide, hirsutulous to hirsute with whitish, rusty or dark-brown hairs; seeds 6–7, the immature seeds ca. 4 mm. long, 2.6 mm. wide. Flowering collections from January to March.

Distribution. At altitudes of 1200–1800 m., mountains in the region of San Sebastián in western Jalisco, and probably Sinaloa, Mexico. Map 17.

Specimens examined. MEXICO. Sinaloa: Sterile material, probably this species: Plants 2–2.5 m. high, in moist, shaded places, Mesa de

Bueso, San Ignacio, 1300 m., *Montes & Salazar 844*, 16 May 1919 (US), *Ortega 482* (MEXU). JALISCO: Brushy slope, near San Sebastián, 3850–5000 ft., *E. W. Nelson 4074*, 16–19 Mar. 1897 (NY, US), *4082* (NY, US); roadside between San Sebastián and the summit of the mountain known as the Bufa de Mascota, 5000–6000 ft., *Nelson 4097*, 20 Mar. 1897 (NY, US); erect, 1.5 m., thicket near stream, Arroyo Seco, s.w. of San Sebastián, 1500 m., *Mexia 1485*, 15 Jan. 1927 (UC); suffrutescent, erect, on steep, pine-forested hillside, east of Arroyo Santa Gertrudis, San Sebastián, 1500 m., *Ynes Mexia 1520–a*, 18 Jan. 1927 (US 1319581-Type; CAS, DS, GH, MO, NY, UC); herb, streamside, Segundo Arroyo, San Sebastián, Sierra Madre, 1500 m., *Mexia 1552–a*, 22 Jan. 1927 (CAS, GH, MO, NY, UC, US).

Tephrosia simulans is undoubtedly closely related to *T. Langlassei*, with which all of these specimens have been identified, but differs from that species in a number of particulars, the most immediately conspicuous of which is the shorter pubescence of all parts except the legume. *Tephrosia Langlassei* is hirsute or villous in varying degrees with golden or rusty, spreading or somewhat recurving hairs, while *T. simulans* is strigillose or hirtellous to hirsutulous with cinereous, golden, or brown hairs usually less than one millimeter long. The more lustrous, thin but rigid and somewhat coriaceous leaflets which are usually merely acute, instead of acuminate as are the membranous leaflets of *T. Langlassei*, and the lack of stomata in the upper epidermis are additional identifying marks of *T. simulans.* The primary bracts of the new species are generally deciduous and much shorter than the persistent bracts of *T. Langlassei* and the calyx-lobes are somewhat broader, usually shorter, less attenuate, and considerably more variable, at times suggesting those of *T. crassifolia.* Completely mature pods have not been seen, but the material available indicates that those of *T. simulans* are about a millimeter narrower than the legume of *T. Langlassei.* Although in many species pubescence-characters have proved too variable to be of much taxonomic value, in this instance the shorter trichomes of *T. simulans* appear to be a trustworthy point of recognition. Additional field-study of both species is, nevertheless, highly desirable.

37. **Tephrosia quercetorum** sp. nov.

Planta perennis decumbens vel erecta herbacea, 3–6 dm. alta. Folia 7–13 foliolata; foliola oblonga, oblongo-oblanceolata vel lineari-oblonga, raro oblongo-obovata, basi plerumque acuta vel cuneata, apice rotundata vel acuta, mucronata, 17–58(–62) mm. longa, 6–14(–18) mm. lata, tenuia, supra viridia,

nitida, venis conspicuis, glabra vel nervus primarius strigillosus, subtus pallidiora, substrigillosa pilis albidis. Inflorescentiae terminales 6–27 cm. longae, erectae, plerumque efoliatae, pedunculis 2–5 cm. longis, nodi floriferi 4–17. Bracteae primariae lineari-lanceolatae vel lineares, deciduae. Pedicelli 5–13 mm. longi. Calyx 8–12 mm. longus, hirtellus et hirsutulus vel strigillosus vel strigillosus et breve strigosus pilis cinereis, ferruginosis et atrobrunneis; lobi superiores 4–6 mm. longi, lobi laterales 5–8 mm. longi, lobus infimus 6–9 mm. longus. Corolla roseo-purpurea; vexillum basi macula viridia, lamina 16–19 mm. longa, 14–19 mm. lata, extus strigillosa pilis albidis; alae 16–19 mm. longae, auriculatae; carina 16–18 mm. longa, ungue 4–5 mm. longo. Tubus staminalis 12–15 mm. longus; stamen vexillare tubo connatum, basi liberum. Ovarium dense brevique strigosum; stylus barbatus; ovulae circa 9–10. Legumen immaturum circa 4–4.5 mm. latum, hirsutulum pilis cinereis, ferruginosis et atrobrunneis.

Decumbent or erect herbaceous perennial 3–6 dm. high from heavy woody roots and a slender branching crown, the stems several, simple or branched, nearly terete below, striate, angular and sulcate above. Stems, petioles, rachises, petiolules and axes of inflorescences strigillose to short-strigose, or the inflorescences somewhat hirsutulous with cinereous, rusty or dark-brown hairs. Leaves ascending, (4.5–)7–13 cm. long, the petioles 3–16 mm. long, much shorter than the lowermost leaflets, the rachis (2–) 3–7.5 cm. long, both petiole and rachis channeled on the upper side; stipules linear, acuminate, 5–12 mm. long, brown, persistent at least until anthesis; leaflets of the principal leaves (5–)7–13, oblong, oblong-oblanceolate, or linear-oblong, occasionally oblong-obovate, the base generally acute or cuneate, the apex rounded to acute, mucronate, 17–58(–62) mm. long, 6–14(–18) mm. wide, thin but firm, the lateral veins prominent and conspicuously reticulate between, the leaflets bright green, lustrous, glabrous or strigillose along the midrib above, pale below, moderately strigillose to short-strigose with fine whitish hairs, sometimes appearing silvery or canescent; petiolules 1.5–2.5 mm. long. Inflorescences terminal, 6–27 cm. long, ascending or erect, leafless or the lowermost node with a leaf, exceeding the leaves, the axis angular and sulcate, the peduncle 2–5 cm. long, the flowering nodes 4–17; buds 4–6 at a node, 2–4 flowering. Primary bracts linear-lanceolate to linear, long-acuminate, 6–8 mm. long, 1 mm. or less wide, deciduous, brown; secondary bracts linear-filiform, 4–7 mm. long, deciduous. Pedicels 5–13 mm. long, ascending. Dried flowers 18–21 mm. long. Calyx 8–12 mm. long, hirtellous and hirsutulous to strigillose or strigillose and short-strigose with various combinations of cinereous, rusty, and dark-brown hairs, the lobes lanceolate to lance-ovate, long-acuminate, the upper lobes 4–6 mm. long, the lateral 5–8 mm. long, the lowermost 6–9 mm. long. Corolla rose-purple, becoming violet in age, the banner with a conspicuous green spot near the base; blade of the banner suborbicular, 16–19 mm. high, 14–19 mm. wide, strigillose on the back with fine white hairs, the claw 3–4 mm. long; wings 16–19 mm. long, 4.5–5 mm. broad, with an acute auricle, the claw 2.5–4.5 mm. long; keel 13–18 mm. long, 7 mm. deep, the claw 4–5 mm. long. Staminal tube 12–15 mm. long, the vexillary stamen coherent with the tube, free at the base, with a prominent callosity on the upper side near the base. Ovary

densely short-strigose, the style barbate; ovules ca. 9 or 10. Immature legume 4.5 cm. long, 4–4.5 mm. wide, hirsutulous with cinereous, rusty, and dark-brown hairs. PLATE 1154.

DISTRIBUTION. Known only from the mountains in the region of Taxco, Guerrero, Mexico. Map 21.

SPECIMENS EXAMINED. MEXICO. GUERRERO: Oak woods, Chacualco Trail, Taxco, *Ruth Q. Abbott 333*, 12 Aug. 1937 (GH); steep, rocky, acid slopes with huge exposed boulders and ledges in oak woods, Huajajutla, near km. 151–153 on highway above Taxco, ca. 6000 ft. (1800–1900 m.), *H. E. Moore, Jr. & C. E. Wood, Jr. 4547*, 16 Aug. 1948 (GH-Type; MEXU, UC, Bailey Hortorium); north of Iguala, *E. Hernandez X. & E. J. Alexander XA159*, 12 Aug. 1945 (GH, MEXU).

Tephrosia quercetorum is a handsome plant of well-drained rocky soils in oak woods in the neighborhood of Taxco, Guerrero, Mexico. The usually decumbent habit, the 7–13 thin, lustrous, oblong, oblong-oblanceolate or linear-oblong leaflets with the undersurfaces pale and white-strigillose or short-strigose are distinctive, as are the lanceolate to lance-ovate, long-acuminate calyx-lobes. The calyx is strongly reminiscent of *T. Pringlei* and *T. Watsoniana* and the vegetative characters perhaps approach those of *T. Watsoniana* as closely as any other species. The affinities of *T. quercetorum* are not, however, obvious. The presence of dark-brown hairs in addition to the usual rusty or cinereous pubescence normally encountered in many species is remarkable, but is not a constant feature.

38. **Tephrosia Watsoniana** (Standl.) Macbr.

Clitoria? sericea S. Wats. Proc. Amer. Acad. **22:** 407. 1887. On grassy hillsides, Río Blanco [ca. 10 mi. north by west of Guadalajara], Jalisco, Mexico, *Edward Palmer 321*, Aug. 1886 (GH-Type; MEXU, NY).

Cracca sericea (S. Wats.) Rose, Contr. U. S. Nat. Herb. **12:** 271. 1909, not A. Gray, 1883.

Cracca Watsoniana Standl. Contr. U. S. Nat. Herb. **23:** 472. 1922. Substitute name based on *Clitoria? sericea* S. Wats.

Tephrosia Watsoniana (Standl.) Macbr. Field Mus. Publ. Bot. **4:** 87. 1925, not. *T. sericea* (Thunb.) Pers. 1807, or *T. sericea* Bak. in Oliver, 1871.

Erect or somewhat decumbent perennial, somewhat suffruticose at the base, 1–4 dm. high, from a woody branched crown and heavy woody root; stems clustered, sulcate, angled above, nearly terete below. Stems, petioles, rachises and axes of the inflorescences hirtellous and hirsutulous to strigillose or short-strigose with fine cinereous hairs. Leaves unifoliolate or, on large plants, 1–7-foliolate, principally 3–12 cm. long, the rachis when present 0.7–3 cm. long; stipules linear, acute, to linear-subulate,

5–12 mm. long, 1–1.5 mm. or less wide, brown and persistent; leaflets linear-oblong to oblanceolate, oval or obovate, 20–80 mm. long, 9–30 mm. wide, obtuse or rounded at the apex, mucronate, obtuse or rounded at the base, somewhat rigid but thin, green, moderately to densely covered with very fine appressed or ascending hairs above and soft to the touch, appearing canescent, and often glabrate in age; leaflets densely short-strigose or somewhat hirsutulous and silvery below with fine hairs, sericeous and soft, the veins prominent, conspicuously reticulate between the principal laterals; petiolules 1–4 mm. long. Inflorescences terminal, erect, leafless (or the lowermost node with a leaf), few-flowered, 5–24 cm. long, the peduncle 2–10 cm. long, the flowering nodes 2–11; buds 4–5 at a node, 1–3 flowering, 1 or 2 fruiting. Primary bracts linear-lanceolate to subulate, 5–10 mm. long, 1.5 mm. or less wide, brown, persistent; secondary bracts subulate, 3–5 mm. long. Pedicels 5–12 mm. long, slender, ascending. Dried flowers 15–20 mm. long. Calyx 6.5–9.5 mm. long, hirtellous and hirsutulous to strigillose and short-strigose with cinereous and/or rusty hairs, the lobes narrowly triangular and short- or long-acuminate, to subulate-attenuate, the upper lobes 2.5–6 mm. long, the lateral 4–7 mm. long, the lowermost 4–7.5 mm. long. Corolla probably rose-purple, with a green spot at the base of the banner, but purple or violet in dried specimens; blade of the banner nearly orbicular, 13–18 mm. high and broad, densely strigillose on the back, the claw ca. 3.5 mm. long; wings 14–16 mm. long, 5–6 mm. wide, auricled, the claw ca. 3 mm. long; keel 15–17.5 mm. long, 6.5–8 mm. deep, the claw 2.5–3.5 mm. long. Staminal tube 10–12 mm. long, the vexillary stamen coherent with the tube, free at the base, thickened on the upper side near the base. Ovary densely strigillose. Legumes spreading or ascending, 3–5 cm. long, 5–5.5 mm. wide, hirtellous to strigillose with cinereous and/or rusty hairs; seeds 6–7, the mature seeds not seen.

Distribution. Open hillsides, oak and pine woods, 1500–2100 m., Nayarit, Jalisco, and western Guerrero, Mexico. Map 21.

Specimens examined. MEXICO. Nayarit: In the Sierra Madre near Santa Teresa, *Rose*, 10 Aug. 1897 (US); Sierra Madre between Santa Gertrudis and Santa Teresa, *Rose 2110*, 8 Aug. 1897 (GH, NY, US). Jalisco: Grassy hillsides, Río Blanco, *Palmer 321*, Aug. 1886 (GH, NY); near Guadalajara, *Rose & Painter 7477*, 30 Sept. 1903 (US); granitic hills near Guadalajara, 5500 ft., *Pringle 9736*, 10 July 1902 (GH, NY, US); rocky hills near Guadalajara, *Pringle 4449*, June–July 1895 (GH, NY, US); rocky mountain slopes with open oak woods, vicinity of Arenal on highway from Guadalajara to Tequila, 5300 ft., *Moore & Wood 4835*, 31 Aug. 1948 (GH, UC, Bailey Hortorium). Guerrero: Between Ayusinapa and Petatlán, 5000–7000 ft., *Nelson 2130*, 14 Dec. 1894 (US).

This attractive species is one of three Tephrosias in which the leaves are normally unifoliolate, although on large plants of this species some leaves may be 3- or even 7-foliolate. The unifolio-

late condition presumably has been derived independently in all three instances, for the other two species, *T. platyphylla* and *T. madrensis*, are not closely related either to *T. Watsoniana* or to each other.

39. **Tephrosia crassifolia** Benth.

Tephrosia crassifolia Benth. Bot. Voy. Sulph. 80. 1844. Acapulco, Guerrero, Mexico, *Hinds*, 1842 (K-Type).

Cracca crassifolia (Benth.) Kuntze, Rev. Gen. **1:** 174. 1891.

Cracca axillaris M. E. Jones, Contr. West. Bot. **15:** 137. 1929. "Among the live oaks," El Tigre Mine, Acaponeta, Nayarit, Mexico, *M. E. Jones 23022*, 1 Mar. 1927 (POM-Type; F, GH, UC, US).

Tephrosia lanata var. *velutina* (Rydb.) Macbr. Field Mus. Publ. Bot. **4:** 87. 1925, probably as to plant, not as to name. Based on *Cracca velutina* Rydb. (= *T. pachypoda* Riley) of which the type-collection (*Lamb 575*, Zopilote, Nayarit) is a mixture of *T. pachypoda* and *T. crassifolia*. See Morton, Contr. U. S. Nat. Herb. **29:** 101. 1945.

Cracca lanata Mart. & Gal. sensu Rydb. N. Amer. Fl. **24:** 171. 1923, as to material from Sinaloa and Guerrero, Mexico.

Erect or sprawling herbaceous or shrubby perennial 1–2 m. high. Stems, petioles, rachises, petiolules and axes of inflorescences moderately to densely hirtellous or hirtellous and hirsutulous with spreading rusty hairs, the inflorescence sometimes strigillose. Leaves spreading, (5–)8–17 cm. long, the petioles 5–26 mm. long, shorter than the lowermost leaflets of a leaf, the rachis 2–7 cm. long; stipules linear-acuminate, ca. 8 mm. long, 1.5 mm. wide, deciduous; leaflets of the principal leaves 5–9, the terminal leaflet largest, 4.5–7 cm. long, 2–4 cm. wide, elliptic, elliptic-obovate or somewhat rhombic, the lowermost leaflets smallest, 1.5–4 cm. long, 1.2–2.7 cm. wide, oval to ovate or elliptic, the base of the leaflets obtuse, somewhat cuneate or rounded, occasionally subcordate, the apex obtuse or rounded, occasionally retuse, with a short mucro; leaflets coriaceous, overlapping each other, dark green above, the margins wavy, the veins impressed, the surface evenly hirtellous with fine tawny hairs 0.4–0.6 mm. long, or with additional scattered hairs 1 mm. long, soft to touch, glabrate in age, lustrous; leaflets hirtellous beneath with tawny or rusty hairs, especially along the veins, velutinous, soft, the veins conspicuous, reticulate between the principal lateral veins; petiolules 2–4 mm. long. Inflorescences axillary, solitary or with 1 or 2 shorter inflorescences or subdigitate with 1 or 2 branches near the base, slender, ascending, spreading or recurving, 4–15 (–20) cm. long, the peduncle 1–5(–10) cm. long; flowering nodes 5–ca. 25, evenly distributed, not crowded in appearance; buds 5–7 at a node, 3–5 flowering, 1 or 2 fruiting. Primary bracts linear, acuminate, often recurving, 4–6 mm. long, 1 mm. or less wide, deciduous; secondary bracts inconspicuous, 1–3 mm. long, deciduous. Pedicels slender, 4–9 mm. long, spreading or ascending, hirtellous or strigillose. Dried flowers 12–15 mm. long. Calyx cup-like, 4–5 mm. long, hirtellous or strigillose

with rusty (and sometimes cinereous) hairs, occasionally with scattered longer hairs, the tube ca. 3 mm. long, the lobes deltoid, abruptly subulate, the upper lobes 1–2 mm. long, the lateral 1.5–3 mm. long, the lowermost 2–3.5 mm. long. Corolla purple in dried specimens, the banner with a green spot at the base within, densely strigillose with golden hairs without; blade of the banner suborbicular, 11–14 mm. high and wide, the apex retuse, the claw 2–2.5 mm. long; wings 13–15 mm. long, 4–6 mm. wide, slightly or not auricled, the claw 2–2.5 mm. long; keel 13–15 mm. long, slightly or not auricled, the claw 3–3.5 mm. long. Staminal tube 10–11 mm. long, the vexillary stamen coherent with the tube, free at the base, with a conspicuous 2-lobed callosity on the upper side near the base. Ovary densely strigillose. Mature legume not seen, the immature legume nearly straight, resembling that of *T. lanata* in shape, 3–3.5 cm. long, 4–5 mm. wide, hirtellous to hirsutulous with rusty (and sometimes cinereous) hairs, velvety in appearance; seeds 5–7, the mature seeds not seen.

DISTRIBUTION. Western slopes of the Sierra Madre Occidental, 700–1500 m., from Sinaloa to Guerrero, Mexico. Map 23.[1]

SPECIMENS EXAMINED. MEXICO. SINALOA: Deep, rocky, shady canyon with *otate* and palms, oak forest, 3000 ft., Capadero, Sierra Tacuichamona, *Gentry 5571*, 12 Feb. 1940 (GH) (for exact location, see Gentry 1946a). NAYARIT: Zopilote [Zopelote on label of specimen], 2000–3000 ft., *Lamb 575* (part), Feb. 1895 (A, GH, US); among the live oaks, Tiger Mine, Acaponeta, *M. E. Jones 23022*, 1 Mar. 1927 (F, GH, US, UC). JALISCO: Streamside, Hacienda del Otal, San Sebastián, Sierra Madre Occidental, 1500 m., *Mexia 1693-a*, 15 Feb. 1927 (US). GUERRERO: Acapulco, *Hinds*, 1842 (K); Sierra Madre, 1400 m., (apparently from the Sierra Madre between and north of Nuxco and San Luis or Coyuquilla, Dist. Galeana; see discussion, *T. major*), *Langlassé 851*, Feb. 1899 (K).

The lax, often spreading, uncrowded inflorescences, the distinctive calyx and shorter pubescence set *Tephrosia crassifolia* apart from *T. lanata* which it resembles in habit, in number, texture, and often shape of leaflets, and in axillary inflorescences. *Tephrosia crassifolia* appears to be a species of the western Sierra Madre from Sinaloa to Guerrero, while the range of *T. lanata* extends along the slopes of the eastern Sierra Madre from Veracruz into Guatemala and Honduras. This geographical break may possibly prove to be less distinct, however, than would appear from the specimens now in herbaria, for during the summer of 1948 sterile plants of a *Tephrosia* 2–3 feet high with 5–9 lustrous, coriaceous leaflets and abundant pubescence were collected on steep grassy slopes with open pine woods and scattered oaks at

[1] Since Map 23 was reproduced the Guerreran locality accompanied by "?" has been determined more definitely and should be moved southeastward to Dist. Galeana, Guerrero.

an altitude of about 3300 feet between Acahuizotla and Agua de Obispo at km. 339–340 on the highway to Acapulco, Guerrero (*Moore & Wood 4693*, GH, UC, Bailey Hortorium). These plants appear to be identical vegetatively with *T. lanata* from Veracruz and may represent that species, in which event this will be another of those plants which cross over from east to west south of the Central Plateau of Mexico.

It is with some misgivings that the name *Tephrosia crassifolia* Benth. is retrieved from the synonymy of *T. lanata* Mart. & Gal. and adopted as the name for the western member of this pair of species. The type-specimen, collected at "Acapulco", Guerrero, in 1842 (probably from some distance inland where pine forests occur), leaves much to be desired. It consists of two branches with numerous inflorescences, one branch bearing very young buds and the other an immature fruit. A second immature fruit is contained in a pocket on the sheet. No flowers are present, although a few calyces remain. As to vegetative characters, this collection resembles *T. lanata* more strongly than it does specimens from western Mexico. The inflorescences and distinctive calyces link this plant with others from the west, however, so that it would appear proper to include it with those from Jalisco and farther north. Unfortunately, the legumes give no additional information here and, although attempts were made to uncover differences in the leaflet-venation and epidermal structure which might make possible the certain identification of sterile specimens, these met with no success.

Should it eventually be proved that the name *Tephrosia crassifolia* is based upon an aberrant specimen of *T. lanata*, a new combination must be based upon *Cracca axillaris* M. E. Jones, which is without doubt quite distinct morphologically and geographically from *T. lanata*. In view of the few specimens now available, of our scanty knowledge concerning large areas of Mexico, and of our consequent lack of good distributional information, it appears better to resurrect *Tephrosia crassifolia* than to perpetrate another new combination.

40. **Tephrosia lanata** Mart. & Gal.

Tephrosia lanata Mart. & Gal. Bull. Acad. Brux. **10**(2): 48. 1843. "Habite les savanes à malpighiacées de Zacuapan, à 3,000 pieds," (appar-

ently the modern town of Axocuapan or Axocuápam, north of Huatusco; see Sp. 33), Veracruz, Mexico, *H. Galeotti 3286*, August.

Cracca lanata (Mart. & Gal.) Kuntze, Rev. Gen. **1:** 175. 1891.

Erect herbaceous to shrubby perennial about 1 m. high, branching monopodially. Stems, petioles, rachises, petiolules, pedicels and calyces densely hirsutulous with grayish to rusty spreading hairs, appearing pilose, the axes of the inflorescences often less densely so. Principal leaves spreading, 7–17 cm. long, the petioles 5–23 mm. long, much shorter than the lowermost leaflets, the rachis 1.1–6 cm. long; stipules lanceolate-deltoid, acuminate, 6–10 mm. long, 2.5–3 mm. wide at the base, persistent but often broken, densely hairy; leaflets of the principal leaves 5–9, the terminal leaflet largest, 3–13 cm. long, 1.5–6 cm. wide, usually elliptic to oblong-elliptic or oblong-ovate, the lowermost leaflets smallest, 1.2–6 cm. long, 0.9–2.8 cm. wide, elliptic to broadly oval or ovate, the base of the leaflets rounded, often subcordate, the apex slightly retuse, rounded or obtuse, with a small hairy mucro ca. 1 mm. long; leaflets coriaceous, the veins somewhat impressed above, hirsutulous with fine tawny hairs, especially along the midrib, often glabrate, lustrous, densely hirsutulous below, especially along the veins, with fine spreading cinereous to tawny hairs, appearing woolly, soft to the touch, the veins prominent, reticulate between the principal laterals; petiolules 1–3 mm. long. Inflorescences axillary, terminating naked or leafy branches, 3–22 cm. long, slender, ascending, shorter or longer than the leaves, sometimes with 1 or 2 branches from the axils of bracts, or with 1 or 2 shorter inflorescences from the same axil, the peduncles 1–10 cm. long, the flowering nodes 5–25, usually crowded; buds 3–5 at a node, 2 or 3 of these flowering, 1 or 2 fruiting. Primary bracts linear-lanceolate (rarely lanceolate), acuminate, 5–10 mm. long, 1–1.5(–2) mm. wide, sometimes persisting but usually deciduous, glabrous within; secondary bracts linear, acuminate, 4–6 mm. long, 0.5–1 mm. wide. Pedicels slender, ascending, 5–10 mm. long. Dried flowers 13–15 mm. long. Calyx 6–9 mm. long, densely hirsutulous, the tube 2.5–3 mm. long, the upper lobes subulate, 3.5–4 mm. long, the lateral and lowermost lobes lance-subulate, attenuate, 4.5–6 mm. and 5.5–7 mm. long, respectively. Corolla rose-purple; blade of the banner suborbicular, 12–15 mm. high, 12–14 mm. broad, densely covered with tawny hairs on the back, the claw 2–3 mm. long; wings 13–16 mm. long, 3–5.5 mm. wide, slightly auricled, the claw 2.5–3 mm. long; keel 13–15 mm. long, exauriculate, the claw 3–3.5 mm. long. Staminal tube 10–11 mm. long, the vexillary stamen coherent with the staminal tube, free at the base, with a conspicuous callosity on the upper side near the base. Ovary densely strigillose. Legumes nearly straight, (2.5–)3–4.5 cm. long, 5–6 mm. wide, somewhat rounded at the distal end, short-beaked on the upper side, spreading or ascending, densely hirsutulous with spreading rusty or cinereous hairs up to 1.5 mm. long, pilose; seeds 3–8, oval-reniform in outline, somewhat compressed, 3.6–3.8 mm. long, 2.4–2.8 mm. wide, brown variegated with black. Flowering collections from August to March.

DISTRIBUTION. MEXICO. VERACRUZ: Zacuapán, *Purpus 2230*,

Nov. 1906 (GH, MO, NY, UC, US); open forests and plains, Zacuapán, *Purpus 10822*, Oct. 1926 (US); rocky oak forests, Rancho Viejo, *Purpus 10822*, Feb. 1933 or Mar. 1934 (DS, US), *14314*, Apr. 1930 or Mar. 1932 (A, F, UC), *16692*, Mar. 1936 (US), *14004*, Feb. 1931 (F); Mirador, *Liebmann 4647*, Oct. or Nov. 1841 (F); Mirador, 3600–3800 ft., *Sartorius* (US).

GUATEMALA. Chiquimula: Pine forest, Socorro Mt., between Finca San José (1.5 mi. s.e. of Concepción de las Minas) and Montaña Nube (Montaña Volcancitos), 1200–1700 m., *Steyermark 30969*, 1 Nov. 1939 (F). Jalapa: Montaña Durazno, 2 mi. east of San Pedro Pinula, 1400–1900 m., *Steyermark 32997*, 10 Dec. 1939 (A, F). Zacapa: Oak-pine woods along upper reaches of Río Sitio Nuevo, between Santa Rosalía and first waterfall, 1200–1500 m., *Steyermark 42283*, 9 Jan. 1942 (F).

HONDURAS. Cortés: San Pedro Sula, 800 ft., *Thième*, Nov. 1888 (J. D. Smith's Dist. No. 5202) (K, US).

Tephrosia lanata and the preceding species, *T. crassifolia*, appear to be a closely related pair, the one extending from Veracruz to Guatemala and Honduras, the other from Sinaloa to Guerrero. Both are little-branched, suffrutescent plants somewhat woody at the base, with 5–9 large, coriaceous leaflets and axillary inflorescences with the lowermost inflorescences first and best developed. The two species differ in several particulars, of which the features of the calyx are most striking. The calyx of *T. lanata* is 6–9 mm. long, densely hirsutulous, with the lateral lobes lance-subulate, attenuate, and 4.5–6 mm. long, while that of *T. crassifolia* is 4–5 mm. long, hirtellous or strigillose, with the lobes deltoid, abruptly subulate, the lateral lobes only 1.5–3 mm. long.

41. **Tephrosia Abbottiae** sp. nov.

Planta perennis erecta gracilis herbacea vel fruticosa, 3–20 dm. alta, undique dense hirsutula vel aliquantum tomentosa pilis mollibus cinereis vel fulvis. Folia praecipua 9–18 cm. longa; petioli 5–20 mm. longi; stipulae ovatae vel lineari-lanceolatae, 9–15 mm. longae, 3–5 mm. latae, deciduae; foliola foliorum 7–11, angustato-elliptica, oblonga vel oblongo-lanceolata, basi rotundata, apice obtusa, mucronata, foliola superiora folii grandissima, (30–)40–73 mm. longa, (11–)15–22(–24) mm. lata, inferiora saepe elliptica, (17–)27–40 mm. longa, (10–)15–19 mm. lata, firma, aliquantum coriacea, supra hirtella vel hirsutula pilis fulvis, subtus dense hirsutula vel tomentosa pilis cinereis. Inflorescentiae terminales et axillares laxae erectae vel ascendentes, 7–30 cm. longae, pedunculis 5–13 cm. longis; nodi floriferi 3–11, alabastra circa 3–5 per nodum. Bracteae primariae lanceolatae vel lanceolato-ovatae, acuminatae, dense villosae, 16–17 mm. longae, 4 mm. latae, deciduae; bracteae secundariae dense villosae, 12–16 mm. longae, deciduae. Pedicelli 10–20 mm. longae, dense villosae. Calyx campanulatus, 14–16 mm. longus, densissime villosus pilis cinereis vel (lobis) ferruginosis; lobi superiores 3–8 mm. longi; lobi laterales lanceolati acuminati, 10–12 mm. longi; lobus infimus lanceolatus vel lanceolato-ovatus, acuminatus, 11–13 mm. longus; bracteolae 2, lineari-lanceolatae, villosae, deciduae, 5–10 mm. longae. Corolla roseo-purpurea; vexillum basi macula viridia, lamina subquadrata vel suborbicularis, 24–27 mm. alta et lata,

extus hirsutula, ungue 8–10 mm. longo; alae 30–34 mm. longae, 10–11 mm. latae, exauriculatae, ungue 8 mm. longo; carina 32–34 mm. longa, 12–14 mm. profunda, exauriculata, ungue 8 mm. longo. Tubus staminalis 25–27 mm. longus; stamen vexillare tubo connatum. Ovarium dense hirsutum vel villosum pilis ascendentibus, 11–13-ovulatum; stylus barbatus. Legumen lineare, 7–19 cm. longum, 6–7 mm. latum, densissime villosum pilis mollibus avellaneis vel fulvis; semina 9–10(–13?).

Erect herb or slender little-branched shrub, 3–20 dm. high; stems nearly terete below, angled and somewhat sulcate above. Stems, petioles, rachises and axes of inflorescences densely hirsutulous or somewhat tomentose with soft cinereous or tawny hairs. Principal leaves 9–18 cm. long, the petioles 5–20 mm. long, shorter than the lowermost leaflets; stipules ovate to linear-lanceolate, 9–15 mm. long, 3–5 mm. broad, glabrous on the inner surface, usually deciduous; leaflets of the principal leaves 7–11, narrowly elliptic, oblong or occasionally lance-oblong, the base usually rounded, the apex obtuse, mucronate, the outermost leaflets usually largest, (30–)40–73 mm. long, (11–)15–22(–24) mm. wide, 2.5–4 times as long as wide, the basal leaflets smallest, often elliptic, (17–)27–40 mm. long, (10–)15–19 mm. wide, 1.5–2(–2.5) times as long as broad; leaflets firm or somewhat coriaceous, slightly lustrous, velvety to touch, hirtellous to hirsutulous with tawny hairs above, moderately to densely hirsusulous or somewhat tomentose with cinereous or (along the veins) tawny hairs below, the veins inconspicuous, the areoles between the lateral veins nearly isodiametric; petiolules 2–3 mm. long, hirsutulous with tawny or rusty hairs. Inflorescences terminal and solitary in the upper axils, usually leafless or 1 node with a leaf, lax, erect or ascending, the terminal inflorescence 25–30 cm. long, the axillary inflorescences 7–25 cm. long, exceeding the leaves, the peduncles 5–13 cm. long, the flowering nodes 3–11; buds 3–5 at a node, 3 or 4 flowering. Primary bracts lanceolate to lance-ovate, acuminate, 16–17 mm. long, 4 mm. wide, 7-veined, deciduous; secondary bracts lanceolate, acuminate, 12–16 mm. long, deciduous. Pedicels 10–20 mm. long. Dried flowers 27–35 mm. long. Calyx, pedicels, bracts and bracteoles very densely villous with fine soft cinereous or (on the lobes and bracts) tawny or rusty hairs. Calyx campanulate, 14–16 mm. long, the upper lobes 3–8 mm. long, the lateral lobes lanceolate, acuminate, 10–12 mm. long, the lowermost lobe lanceolate or lance-ovate, acuminate, 11–13 mm. long, ca. 4 mm. wide at the base. Calyx or pedicel with 1 or 2 linear-lanceolate deciduous bracteoles 5–10 mm. long. Corolla rose-purple, violet when dry, the banner with a conspicuous green spot at the base of the blade within; blade of the banner subquadrate or suborbicular, 24–27 mm. high and wide, densely hirsutulous with soft ascending cinereous hairs on the back, the claw 8–10 mm. long; wings 31–34 mm. long, 10–11 mm. wide, exauriculate, the claw 6–7 mm. long; keel 32–34 mm. long, 12–14 mm. deep, exauriculate, the claw 8 mm. long. Staminal tube 25–27 mm. long, the vexillary stamen coherent with the tube, free at the base, with a prominent callosity on the upper side ca. 5 mm. from the base. Ovary densely hirsute to villous with ascending hairs, the style barbate; ovules 11–13. Legumes linear, curving slightly upward, 7–9 cm. long, 6–7 mm.

wide, very densely villous with lustrous tan or (along the sutures) tawny or rusty hairs; seeds 9–10(–13?), the mature seeds not seen. PLATE 1155.

DISTRIBUTION. Known only from the type-locality. Map 22.

SPECIMENS EXAMINED. MEXICO. GUERRERO: "Small tree or shrub," Casahuates, Taxco, *Ruth Q. Abbott 189*, 23 Dec. 1936 (fruit) (GH); herb or slender little-branched shrub, 1–6 ft. high (sterile), on sunny oak-wooded slopes between Casahuates and small reservoir at head of waterfall above town on mountain west of Taxco, 6200–6500 ft. (1900–2000 m.), *H. E. Moore, Jr. & C. E. Wood, Jr. 4586*, 17 Aug. 1948 (GH, UC, Bailey Hortorium); preceding locality, *Ruth Q. Abbott*, 20 Oct. 1948 (flower & young fruit) (GH-Type; UC, Bailey Hortorium).

This distinctive new species was collected in fruit in 1936 by Mrs. Gordon C. Abbott of Taxco in the mountains above Taxco near the village of Casahuates and sent by her to the Gray Herbarium in 1937 along with numerous other interesting plants from this region, including the first material of *Tephrosia quercetorum.* Although the large, furry calyces and legumes and the few, relatively large leaflets marked it as a new species (so annotated by Dr. I. M. Johnston in 1937), I hesitated in early 1948 to base a description on the single fruiting specimen. Accordingly, Dr. H. E. Moore, Jr. and I, in the course of field-work in Mexico, visited Taxco in August 1948, hoping to collect additional material of both *T. quercetorum* and this species. Mr. and Mrs. Abbott extended to us their kind hospitality, enthusiastically gave us detailed directions for locating the plants, and, when we failed to find flowering material at Casahuates, promised to do their best to obtain specimens later in the year. Their best has been highly satisfactory, for after various frustrations they have succeeded in securing flowering specimens which show this new species to be even more remarkable than appeared from the fruit. The rose-purple flowers are the largest of any American species of the genus and these with the large, densely villous calyces and pods, the deciduous bracteoles, large bracts, and few, large leaflets make this (to my mind, at least) the handsomest and one of the most distinct species in the Americas. It seems highly appropriate that this plant should be associated with the name of its discoverer, RUTH Q. ABBOTT.

The relationships of *Tephrosia Abbottiae* seem to be with *T. platyphylla*, *T. diversifolia*, *T. major*, and *T. pachypoda*, all of which are local species of the western Sierra Madre of Mexico.

It is so distinctive, however, that it is not likely to be confused with any of these plants.

42. **Tephrosia pachypoda** Riley

Tephrosia pachypoda Riley, Kew Bull. **1923:** 230. 1923. "Sierra Madre" (between Mazatlán and Durango or Durango and Tepic, probably in Sinaloa or Nayarit), Mexico, *Seemann 2183*, Nov. 1849–Feb. 1850 (K-Type; GH; NY-photograph of GH).

Cracca pachypoda (Riley) G. Ortega, Apuntes Fl. Indig. Sinaloa (Cat. Sist. Pl. Sinaloa) 15. 1929.

Cracca velutina Rydb. N. Amer. Fl. **24:** 171. 1923, not (Spreng.) Kuntze, 1891. Zopilote [Zopelote on label], Nayarit, Mexico, *F. H. Lamb 575* (in part), Feb. 1895 (NY-Type; MO, DS, US–275488). Material of this collection-number in GH and US (201628) is *T. crassifolia* Benth.

Tephrosia lanata Mart. & Gal. var. *velutina* (Rydb.) Macbr. Field Mus. Publ. Bot. **4:** 87. 1925, as to name but probably not as to plant. See Morton, Contr. U. S. Nat. Herb. **29:** 101. 1945.

Cracca lupinoides M. E. Jones, Contr. West. Bot. **15:** 137. 1939. Among the live-oaks, El Tigre Mine, Acaponeta, Nayarit, Mexico, *M. E. Jones 23016*, 1 Mar. 1927 (POM-Type; GH, NY, UC).

Tephrosia lupinoides (M. E. Jones) Morton, Contr. U. S. Nat. Herb. **29:** 101. 1945.

Erect shrubby perennial 1–2 m. high. Stems, petioles, rachises, petiolules, axes of inflorescences, pedicels and calyces densely tomentose with short somewhat tortuous and often tangled cinereous to rusty hairs, soft, woolly. Principal leaves 11–27 cm. long, the petioles 5–25 mm. long, much shorter than the lowermost leaflets of a leaf, the rachises 5–15 cm. long; stipules narrowly triangular, 9–12 mm. long, 4–5 mm. wide, or the uppermost sometimes ovate, the apex rounded, 5 mm. long, 3 mm. wide, deciduous, brown, densely tomentose without; leaflets of the principal leaves 7–11, the terminal and uppermost pairs largest (4.5–)7–12 cm. long, (1.5–)2–6 cm. wide, elliptic, oblong-elliptic, oblong, elliptic or oval, apex of leaflets obtuse, rounded or slightly retuse, acutish, mucronate, the base obtuse, rounded or subcordate; leaflets thick, coriaceous, very veiny above, the veins often reddish, the margins often wavy and rolled under, the upper surface evenly hirtellous with very fine soft somewhat twisted tawny hairs, glabrate, lustrous, the lower surfaces hirtellous to hirsutulous, tomentose with tawny or rusty twisted hairs, especially along the veins, soft to touch, the veins raised, conspicuous, very numerous between the principal lateral veins; petiolules 3.5–7 mm. long, stout, often 2 mm. thick. Inflorescences terminal and solitary in the upper axils, often wand-like, erect or ascending, usually much exceeding the leaves, leafless, 11–60 cm. long, the peduncle (2–)4.5–14 cm. long, often stout, 1.5–4.5 mm. thick, angled, buttressed below the 15–45 flowering nodes; buds ca. 7–9 at a node, ca. 5–7 flowering, 1–4 fruiting. Primary bracts narrowly deltoid to linear-lanceolate, acuminate, 4–8 mm. long, 1–2 mm. wide, deciduous; secondary bracts 2.5–5 mm. long, less than 1 mm. wide, deciduous. Pedicels 5–9

mm. long, ca. 1 mm. thick, ascending. Dried flowers 15–19 mm. long. Calyx campanulate, 5–7 mm. long, the tube 3–4 mm. long, the lobes abruptly short-acuminate, the upper triangular, 2–3 mm. long, the lateral ovate to ovate-lanceolate, 4–5 mm. long, the lowermost ovate-lanceolate to lanceolate, 4–6.5 mm. long. Corolla apparently purplish or rose, the banner with a green spot at the base; blade of the banner nearly orbicular, 13–15 mm. high, 12–17 mm. broad, densely short-hairy without, the claw ca. 3.5 mm. long; wings 13–17 mm. long, 4–7 mm. wide, slightly auricled, the claw 3 mm. long; keel 12–17 mm. long, ca. 6–7.5 mm. deep, slightly auricled, the claw 3.5 mm. long. Staminal tube (12–)13–15 mm. long, the vexillary stamen coherent with the tube, free at the base and apex, with a conspicuous 2-lobed callosity on the upper side near the base. Ovary densely hirsutulous. Legumes linear, straight or slightly curved downward, 4–6.5 cm. long, 5.5–6 mm. broad, strongly ascending or spreading, densely tomentose with rather tortuous and intertwined tawny or rusty hairs (ca. 1.5 mm. long); seeds (4–)9–11, oblong-oval in outline, plump, 3.8–4.2 mm. long, 2.8–3 mm. broad, reddish brown variegated with black. Flowering collections between November and March.

Distribution. Probably in oak woods, mountains of Nayarit and possibly southern Sinaloa, Mexico. Map 22.

Specimens examined. Sinaloa, Durango or Nayarit: Sierra Madre, [between the cities of Mazatlán and Durango or Durango and Tepic], *Seemann 2183* (GH, K; NY-photograph of GH). Nayarit: Zopilote, 2000–3000 ft., *Lamb 575* (part) (A, DS, MO, NY, US); among the live-oaks, Tiger Mine, Acaponeta, *M. E. Jones 23016* (GH, NY, POM, UC).

Tephrosia pachypoda has the dubious distinction of being known at present from three collections, each of which is a type-series! All three clearly represent the same species which is well marked by the large, coriaceous leaves with 7–11 leaflets and by the long, terminal and axillary inflorescences, the calyx, and the slender, densely tomentose legumes.

43. **Tephrosia major** Micheli

Tephrosia major Micheli, Mem. Soc. Phys. et Hist. Nat. Genève **34:** 251. pl. 4. 1903. El Ocote, 700 m., [apparently in southeastern Dist. Montes de Oca between Petatlán, La Morena and Chuveta], Guerrero, Mexico, *E. Langlassé 716*, 15 Dec. 1898 (GH, US).

Cracca major (Micheli) Rose, Contr. U. S. Nat. Herb. **12:** 270. 1909, not Alef. 1861.

Cracca Micheliana Standl. Contr. U. S. Nat. Herb. **23:** 472. 1922. Substitute for *C. major* (Micheli) Standl.

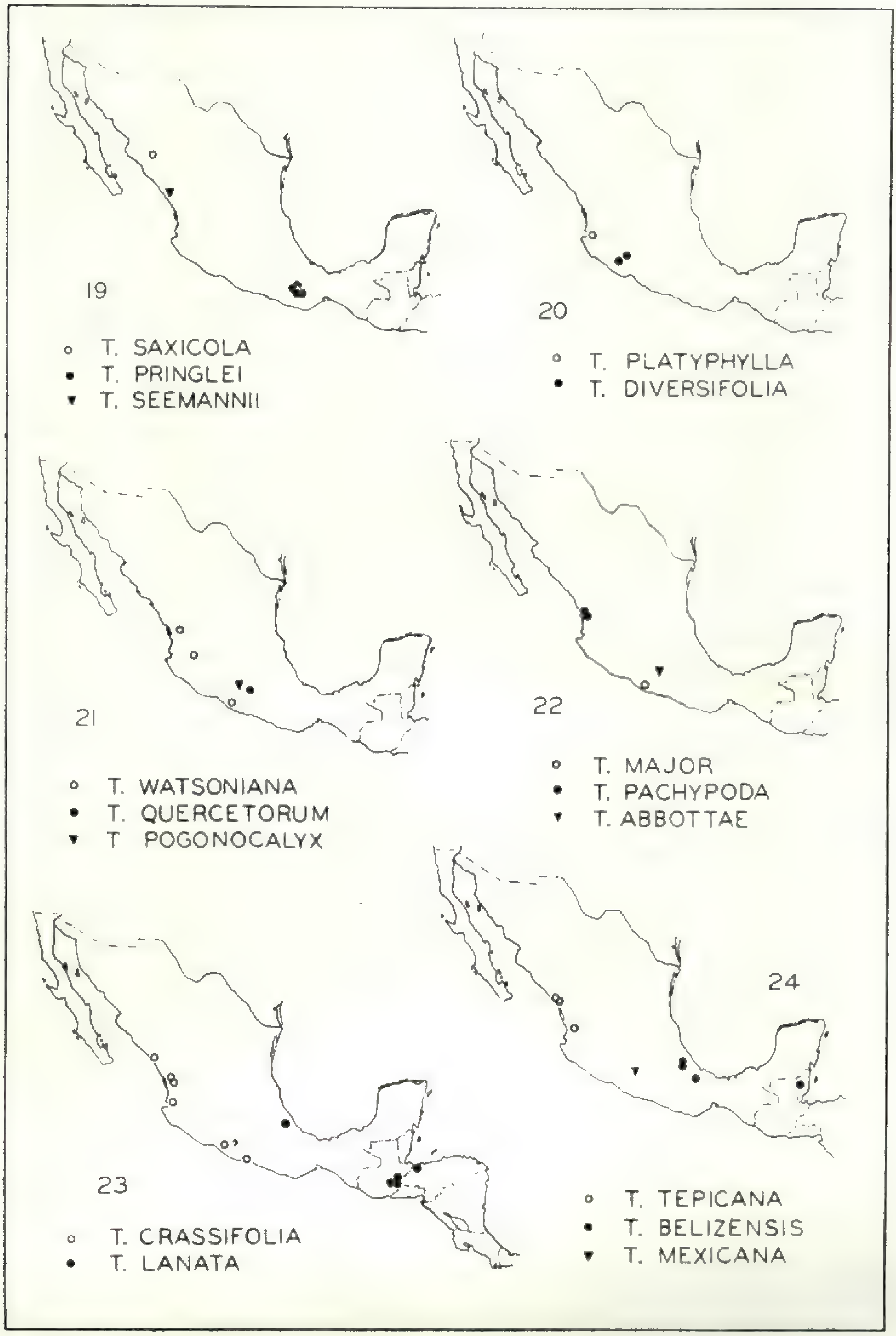
Erect shrubby perennial 1–1.5 m. high; stems rigid, sulcate, angled. Stems, petioles, rachises and axes of inflorescences densely hirtellous-tomentose with grayish, tawny or blackish (soiled), crowded, straight or twisted hairs. Leaves spreading or ascending, 13–20 cm. long, the petiole

5–13 mm. long, the rachis 3–5.5 cm. long; stipules minute, triangular, ca. 1.5 mm. long, tightly appressed and densely tomentose; leaflets of the principal leaves 3–5 (the uppermost sometimes reduced to 1), elliptic, oblong-elliptic, obovate-oblong, or oval, the base of the terminal leaflet at least acute or cuneate, the others cuneate, acute or rounded, usually obliquely so, the apex obtuse, rounded or retuse, with a small mucro; lowermost leaflets smallest, 4–12 cm. long, 2.2–4.5 cm. broad; leaflets coriaceous, thinly covered above with twisted hairs 0.4–1 mm. long, glabrate and shining except along the principal veins, the veins conspicuous, the principal laterals departing from the midrib almost at right angles, curving upward, the lower surface densely tomentose with short tortuous hairs; petiolules 2–6 mm. long, sometimes 2 mm. thick. Inflorescences terminal or solitary in the upper axils, the terminal 7–45 cm. long, often with 1–3 branches 4–23 cm. long from the axils of deciduous bracts, leafless, erect or ascending, usually exceeding the leaves, angled, sulcate, strongly buttressed below the 5–25 distant flowering nodes, the peduncle 3–13 cm. long; buds ca. 5 at a node, 3 of these flowering, 1 or 2 fruiting. Primary and secondary bracts small, linear-lanceolate, 2–5 mm. long, densely tomentose without, glabrous within, deciduous. Pedicels 5–8 mm. long, ascending, densely tomentose with short, twisting hairs. Dried flowers 18–21 mm. long. Calyx 6 mm. long, densely tomentose with short, rather tortuous cinereous to rusty hairs, the tube 4–4.5 mm. long, the upper lobes acuminate, 1–2 mm. long, the lateral triangular, acuminate, to triangular-lanceolate, acuminate, 2.5–4 mm. long, the lowermost triangular-acuminate to lanceolate, 2.5–6.5 mm. long. Corolla "white tinged with violet" (Langlassé) or rose (Hinton), probably white and becoming rose or violet in age, the banner with a green spot at the base; blade of the banner suborbicular, 15–17 mm. high, 17–19 mm. broad, densely tomentose without, the claw 4–5 mm. long; wings 18–20 mm. long, 6–7.5 mm. wide, auriculate, the slender claw 4–4.5 mm. long; keel 17–18 mm. long, with a short, obtuse beak, the claw 4.5 mm. long. Staminal tube 13–14 mm. long, the vexillary stamen coherent with the staminal tube, free at the base, with a 2-lobed thickening on the upper side. Ovary densely hirsutulous. Legumes stout, nearly straight or slightly curved downward, 4–4.5 cm. long, 6–7 mm. wide, beaked, spreading, densely hirsutulous with nearly straight crowded erect somewhat lustrous cinereous to tan hairs, pilose; seeds (6–)8–9, ca. 4 mm. long, 3 mm. wide, brown variegated with black. Flowering collections in December.

Distribution. Oak forests, 600–700 m., in western Guerrero, Mexico. Map 22.

Specimens examined. MEXICO. Guerrero: Granitic soil, El Ocote, 700 m., [probably in southeastern Montes de Oca between Petatlán, La Morena and Chuveta], *Langlassé 716*, 15 Dec. 1898 (GH, US); oak forest, Sierrita–Palo Solo, Dist. Galeana, 600 m., *Hinton 14998*, 13 Dec. 1939 (GH, NY, PH, TEX, US).

The type-locality of this interesting and very distinct species


19
T. SAXICOLA
T. PRINGLEI
T. SEEMANNII
20
T. PLATYPHYLLA
T. DIVERSIFOLIA
21
T. WATSONIANA
T. QUERCETORUM
T POGONOCALYX
22
T. MAJOR
T. PACHYPODA
T. ABBOTTAE
23
T. CRASSIFOLIA
T. LANATA
24
T. TEPICANA
T. BELIZENSIS
T. MEXICANA

is noted in the description and on the labels of the type-collection merely as "El Ocote". This would appear to be in Michoacán, for Micheli mentions in the same paper *Indigofera excelsa* from "Ocote (Michoacán), 700 m., décembre 1898, n. 696," which was almost certainly collected at the same place as *716*. It seems certain, nevertheless, that both these and other Langlassé collections of *Tephrosia* came from Guerrero rather than Michoacán, for when all of the Langlassé collections cited by Micheli in his *Leguminosae Langlasseanae* (Mem. Soc. Phys. et Hist. Nat. Genève **34:** 245–294. pls. 1–28. 1903) are arranged in numerical sequence, it appears from the dates and localities given that Langlassé's numbers follow, with occasional exceptions (often obviously mistakes), the order of collection and, hence, his journey through Michoacán and Guerrero. Although there are many gaps, enough of the localities given by Langlassé can be located accurately to give an idea both of his route and of the general region from which many specimens labeled with obscure locality-names or merely "Sierra Madre" came. From these data it seems that "El Ocote" lies in the mountains of the southwestern part of Dist. Montes de Oca, Guerrero, somewhere between Chuveta, La Morena and Petatlán. By the use of this same method other Langlassé collections of *Tephrosia* can be located either in Dist. Montes de Oca or Dist. Galeana, Guerrero. *Langlassé 324*, 6 Sept. 1898 (*T. nicaraguensis*) is from Mont de San Cristobal, Valle Grande, easily located on modern maps in Montes de Oca. *Langlassé 596*, Sierra Madre, 1300 m., 7 Nov. 1898 (*T. macrantha*) must have come from the same general region as El Ocote (i. e., between Chuveta, La Morena and Petatlán). *Langlassé 670*, 500 m., 26 Nov. 1898 (*T. nitens*) is from La Botella, near the boundary between Montes de Oca and Galeana. *Langlassé 798*, Sierra Madre, 1750 m., Jan. 1899 (*T. Langlassei*, type-collection) appears to be from the mountains north of and between Coyuquilla or San Luis and Nuxco in Galeana, and *851*, Sierra Madre, 1400 m., Feb. 1899 (*T. crassifolia*) from the same general region.

(*To be continued*)

Veronica filiformis a Weed of Lawns and Gardens.—To the list of attractive, dainty and yet "weedy" Veronicas or Speedwells must be added the Creeping Speedwell, *Veronica filiformis* Smith, introduced into the United States from Asia Minor. Placed in a rock-garden or flower-bed this at first delightful addition will in a few years, by vegetative growth, "take over" the bed and encroach on the lawn. It has been said of this plant that if a person once puts it on his property, he will always have something growing there! The ability to flourish in partial shade as well as in the open, on slopes and in somewhat adverse situations not suitable for other plants appeals to some people who are pleased to find a plant which readily makes a much needed and satisfactory ground-cover or helps to hold soil on a terrace or bank.

In New York State *Veronica filiformis* behaves as a perennial, the stems remaining alive over winter and producing a new growth of branches from their axillary buds the next spring. In central New York this plant has completely overrun many lawns and presents a difficult control-problem. Professor Fernald informed me that Mr. Bayard Long has sent it to him from lawns of southeastern Pennsylvania.

Veronica filiformis has two weaknesses: (1) It is susceptible to attack by the fungus *Sclerotium Rolfsii* Saccardo which kills it and causes brown patches on infested lawns; (2) Under New York conditions I have never observed a single capsule maturing and developing seeds. Whether this behavior is general is a question. If any readers of this note have observed seed-production by this species I should greatly appreciate hearing from them.—W. C. Muenscher, Department of Botany, Cornell University, Ithaca, New York

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An Indispensable Bibliography.—The Arnold Arboretum, beginning with Charles E. Faxon's most illuminating bibliographical notes in Sargent's Silva, continued in the Bradley Bibliography and later detailed volumes of similar nature by Rehder and others, has come to be recognized as the home of vast bibliographical undertakings. For several years we have anxiously awaited the great Bibliography of Cultivated Trees and Shrubs[1]. Now,

[1] Alfred Rehder: *Bibliography of Cultivated Trees and Shrubs hardy in the cooler temperate regions of the Northern Hemisphere.* Arnold Arboretum of Harvard University, Jamaica Plain, Mass. 1949. Large 4° xl + 825 pp. $20.00.

at last, we have a large quarto volume containing $5\frac{3}{4}$ lbs. of closely printed and most valuable matter. Begun when Rehder was 76 years of age, the great compendium is available slightly before his 86th birthday, and only shortly before his death. A Foreword by Professor Elmer D. Merrill, dated in 1946, indicates that the manuscript was essentially completed somewhat earlier. The Introduction by the author is dated January, 1949, and contains explanations of terms used and details of procedure.

As to the bibliography itself, one immediately feels profound admiration for the energy and utmost devotion which have resulted in the assembling and coördination of the accepted names and their synonyms. Only one whose absorbing interest is bibliography could have stood the prolonged mental strain of such endless and often puzzling detail. Whether all the accepted varieties and forms are taxonomically significant or often only temporary and infertile sports, perpetuated vegetatively in the garden, is another question. For instance, on page 1 there begins an enumeration of the maintained names under the Old World *Taxus baccata*, 19 recognized varieties and forms. That is very mild, however: *Picea Abies* of the Old World follows (p. 20) with 35 accepted forms, Rehder the ultimate author of five-sixths of them; the eastern North American *P. rubens* gets by with but one accepted form. This unbalance is rather general. American botanists have not vied with the Europeans or those of European viewpoint in the designation of minor vegetative variations. In the new work, where transfers are made from one rank to another, under the genus, species or in whatever category, the well established "stat. nov." is replaced by a newer "grad. nov." This at least makes the new status clear and the very confused usages which have sometimes been followed, of calling plants which were published as forms "var." so-and-so, is avoided. The order of families, genera and species follows that of the 2nd edition of Rehder's Manual of Cultivated Trees and Shrubs. Consequently, one must turn to the latter work for the generic, specific and other interpretations and keys. In the majority of cases there will be complete agreement of most botanists with the interpretation of generic lines; but when some German or Germanic author has segregated American plants, known to him only in the herbarium, as distinct genera upon fallacious or quite inconstant characters, his inadequate judgment is, somewhat singularly, often given preference over that of American students who, presumably, better know the characters of their own plants. Some of these cases have been analyzed in print but with no evident effect upon the author of the new book. Thus, *Helianthemum canadense* (L.) Michx. continues to appear as *Crocanthemum canadense* and *Halimium* is still maintained as a genus apart from *Helianthemum* because Grosser or Janchen so treated them. It was shown in Rhodora, xliii. 609–615, t. 690 (1941), that the reputed "generic" differences used by Grosser, Janchen and, therefore, by Rehder, mostly do not hold, and that *Crocanthemum* as applied by them excludes Spach's type and his stated characters. *Crocanthemum* was based on a plant normally without cleistogamous flowers and correctly defined "Flores omnes 5-petali"; but by Rehder it is distinguished generically by "the presence of small cleistogamous fls.". Similarly, in Rhodora xvi. 21–32 (1914), it was demonstrated that the morphological characters relied upon by Drude, Niedenzu and, therefore, by Rehder, to separate *Arctous* as a genus fully distinct from *Arctostaphylos* break down. Nevertheless, by the reasoning still followed, *Arctous*, in spite of the breaking down of its reputed distinctions, is considered a good genus. Gray, who treated *Arctous* as a section of *Arctostaphylos*, Don, Lindley, Eichler, De Candolle, Bentham and the other sounder taxonomists of the past must have been wrong if Niedenzu and Drude said so. From these and such cases as the segregates of *Pyrus*, discussed in some detail in Rhodora, xlv. 450–452 (1943) and xlix. 229–232 (1947), one can hardly escape the conviction that too often the horticulturist requires no strong nor deep morphological characters to separate genera; superficial, habital and impressionistic features are too often given chief weight, just as in horticultural nomenclature combinations like *Picea Abies*, forma "*pumila glauca*" (Kent)

Rehder are allowed, although ruled out in taxonomic work. The Soft Pines and the Hard Pines, the true Junipers and the Savins, the Aspens and the Cottonwoods or Balsam-Poplars, the subgenera of Birch, Oak, *Rubus, Rhus, Rhododendron, Vaccinium* and many other genera have real and numerous morphological characters but these genera are rightly kept intact, in spite of their differences and often their geographic isolation.

It should be borne in mind, then, that the new and invaluable Bibliography is of *cultivated* trees and shrubs, not of wild ones which the published records examined have failed to reveal as "cultivated" by someone. The mere bringing into the garden and propagating of sprouts from some aberrant form makes the subject eligible for inclusion. The failure to record or make known the bringing into the garden of something else excludes it from consideration. Surely the task of finding what plants are cultivated by hundreds of thousands of enthusiasts is enormous and practically endless; and omissions are bound to be evident to those whose grounds are ornamented by species not accounted for in the published enumerations consulted. For instance, the Montreal Botanical Garden has made an effort to grow all species which occur naturally within the Province of Quebec. The present reviewer has witnessed the remarkable success achieved; and a check of these "cultivated" shrubs, being distributed to other growers, would reveal a considerable number of additions to the Bibliography: our common eastern American *Vaccinium uliginosum* var. *alpinum* for instance. Or, again, the famous plantings of Mrs. J. Norman Henry at Gladwyne would yield similar additions. For several years Mrs. Henry has sought unusual or newly described plants for inclusion in her remarkable plantings. "Seeds, suckers and divisions have been brought home from most of these trips . . . *Rhododendron cumberlandense* . . . is undoubtedly one of the most magnificent of all American shrubs."—Mary G. Henry in Bull. Morris Arb. iii. 42 (1941). Yet it is not included in the new book.

Returning to *Helianthemum* (*Crocanthemum*) *canadense*, a question must arise in the minds of those who intimately know it and its several eastern North American allies, as to why it is included in a work on trees and shrubs. Its herbaceous stems die back and break off every autumn and winter and it perennates from new basal buds, just as do the majority of perennial herbs. If, however, *H. canadense* is considered to be a shrub, why not include the truly shrubby or half-shrubby species of *Silene, Dianthus, Phlox*, etc.? Most old cemeteries have great mounds of *Phlox subulata*, with its long-lived subligneous base and branches and evergreen leaves; and often one sees *Dianthus caesius*, described by Hegi with "Grundachse niederliegend, verholzt". If *Helianthemum canadense* is a shrub surely *Silene acaulis* and other such plants, with dense mats or mounds of long-lived subligneous branches and evergreen leaves, are much more so; if *Diapensia* is included, the equally tough-based *Armeria* or Thrift should not be excluded.

All these and some other similar considerations indicate how intricate and far-reaching is the problem of determining (1) what are shrubs and half-shrubs and (2) what are or have been cultivated somewhere by someone. The present great volume has, through the unending perseverance of its distinguished author, who lived only long enough to see it available to others, caught the great bulk of them up to 1947 (as indicated in the Additions and Emendations). Everyone who is seriously interested in the nomenclature of cultivated plants will be heartily thankful for a task well done and must have the volume constantly at hand. All taxonomists who deal with ligneous and subligneous plants will, likewise, be seriously handicapped without it.—M. L. F.

CHROMOSOMES OF TRILLIUM PUSILLUM MICHX., VAR. VIRGINIANUM FERNALD.—To the few collections listed by M. L. Fernald (RHODORA **45:** 357–413. 1943) for his new variety of *Trillium pusillum*, we add the following:

JAMES CITY CO., VIRGINIA: in forested marsh about three miles west of Williamsburg. In association with *Medeola virginiana* and *Helenium Curtisii*. Common. In flower. May 4, 1949. *Baldwin 12550.* May 15, 1949. *Baldwin 12580.*

SURRY CO., VIRGINIA: in wooded swamp one mile north of Beachland. *Arundinaria* frequent; *Sarracenia purpurea* occasional. June 22, 1949. *Mikula 1501.* July 4, 1949. *Mikula 2234.*

FIG. 1. Chromosomes from root of TRILLIUM PUSILLUM, var. VIRGINIANUM. Drawn × 2200 and reduced to ⅓ in reproduction.

The specimens cited have been deposited in the Gray Herbarium.

The chromosomes of plants from both these stations were examined in propiono-carmine smears of roots, and no cytological differences found. This variety has a $2n$-number of 10, which is characteristic of most representatives of the genus. Chromosomes of a plant from James City County are shown in figure 1.—J. T. BALDWIN, JR., BERNICE M. SPEESE, AND BERNARD MIKULA, College of William and Mary.

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CONTENTS:

Editorial Announcement. 369

Contributions from the Gray Herbarium of Harvard University—No. CLXX. The American Barbistyled Species of Tephrosia (Leguminosae)—concluded. *Carroll E. Wood, Jr.* 369

Further Distribution of Butomus umbellatus in the Great Lakes Region. *L. O. Gaiser.* 385

Potentilla procumbens in the United States. *W. L. Dix.* 390

Setaria Faberii in Illinois. *Robert A. Evers.* 391

A Simple Plastic Collecting Bag. *O. A. Stevens* 393

An Unusual Station for Eastern White Pine. *Henry I. Baldwin.* 393

Errata. 394

Index to Volume 51. 395

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EDITORIAL ANNOUNCEMENT

With great satisfaction the Editorial Board of Rhodora welcomes the election by the Council of the New England Botanical Club of Ralph Carleton Bean to fill the place left vacant through the death of Charles Alfred Weatherby. Mr. Bean, an active and discriminating student of the New England flora, brings to the journal the point of view of the amateur and, likewise, ability to aid in questions of careful presentation of articles.

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CLXX

THE AMERICAN BARBISTYLED SPECIES OF TEPHROSIA (LEGUMINOSAE)

Carroll E. Wood, Jr.

(*Continued from page 364*)

44. **Tephrosia diversifolia** (Rose) Macbr.

Cracca diversifolia Rose, Contr. U. S. Nat. Herb. **12:** 270. fig. 24. 1909. Uruapan, Michoacán, Mexico, *C. G. Pringle 13697*, 14 Nov. 1905 (US 462389-Type; GH).

Tephrosia diversifolia (Rose) Macbr. Field Mus. Publ. Bot. **4:** 87. 1925.

Erect suffrutescent perennial ca. 5–10 dm. high; stems clustered, nearly terete, striate below, obtusely angled, sulcate above, generally herbaceous. Stems, petioles, rachises and axes of inflorescences densely covered with short, fine, twisting cinereous to rusty hairs, soft to the touch. Leaves ascending, 7–13 cm. long, sessile or with petioles 1–4 mm. long, the rachis when present 0.5–2.5 cm. long; stipules triangular to linear, acute or acuminate, 7 mm. or less long, persistent, often recurving; leaflets 1–5, the terminal the largest, oblong to elliptic, the base acute, obtuse, or rounded,

the apex obtuse, rounded, or retuse, mucronulate, 6–10 cm. long, 2.4–4 cm. wide, the lowermost pair of leaflets usually much smaller, suborbicular, oval, ovate or elliptic, the base often oblique, 1.5–4.5 cm. long, 1.6–3.5 cm. wide; leaflets coriaceous, veiny above, at first strigillose with very fine flexuous cinereous to rusty hairs, glabrate or nearly so and shining above, densely white-tomentose below with short, very fine, matted hairs, the veins prominent, the margins undulate, subcrenate; petiolules 1–3 mm. long, ca. 1.5 mm. in diameter. Inflorescences terminal and solitary in the upper axils, 3–30 cm. long, the terminal often paniculate with 1–5 branches 2–17 cm. long from the axils of small deciduous bracts, erect or ascending, leafless, usually exceeding the leaves, the peduncle 1–10 cm. long, the flowering portion dense, short, the flowering nodes 3–ca. 15; buds at a node apparently few to many, probably 2 or 3 flowering. Primary bracts oval to orbicular, 3.5–9 mm. high, 3–8 mm. broad, abruptly short-acuminate, somewhat spathaceous, often persisting, conspicuous, crowded, densely short-tomentose without, reddish and glabrous within. Pedicels 6–9 mm. long, ascending, tomentose. Dried flowers 20–25 mm. long. Calyx 13–15 mm. long, densely hirsutulous-tomentose with somewhat tortuous and tangled cinereous to tawny or dark-brown hairs, the tube 5–6 mm. long, the upper lobes long-acuminate, 5–8 mm. long, the lateral oblong-lanceolate to ovate-lanceolate, obliquely acuminate, 8–11 mm. long, ca. 3.5 mm. wide, the lowermost oblong to oblong-obovate, abruptly short-acuminate, 10–11 mm. long, 5–6.5 mm. wide; calyx with 2 conspicuous broadly (sometimes obliquely) oval bracteoles 8–10 mm. high, 10–15 mm. wide, the apex abruptly short-acuminate or mucronate, the bracteoles caducous, spathaceous, reddish and glabrous within, densely short-tomentose without with cinereous to dark-brown hairs. Corolla violet in recently dried specimens; blade of the banner nearly orbicular to oval, 16–18 mm. high, ca. 21 mm. broad, densely silky hirsutulous-tomentose on the back, broadly cuneate at the base, tapering into a distinct claw ca. 6 mm. long; wings 20–23 mm. long, 7–8 mm. wide, with a rounded auricle, the claw 6–7 mm. long; keel 19–20 mm. long, 7–8 mm. deep, slightly auricled, the claw 7 mm. long. Staminal tube 13–16 mm. long, the vexillary stamen coherent with the staminal tube, free at the base, broad and flattened on the upper surface. Ovary densely appressed-hirsutulous. Legumes nearly straight, short-beaked, (1.5–)3–4.5 cm. long, 8–10 mm. wide (including pubescence), somewhat spreading, very densely hirsutulous with nearly straight, crowded, erect, somewhat lustrous tawny hairs, pilose; seeds (1–)5–6, the mature seeds not seen, the immature seeds nearly orbicular. Flowering collections from November to January.

Distribution. Pine forests, 1700–1800 m., mountains of western Michoacán, Mexico. Map 20.

Specimens examined. MEXICO. Michoacán: Uruapan, *Pringle 13697*, 14 Nov. 1905 (GH, US); mountain-side near Coru Station, 6000 ft., *Pringle 10347*, 26 Jan. 1907 (GH, MEXU, NY, PH, UC, US); shrub 0.75 m. high, pine forest, Puerto Zarzamora, 1740 m., Dist. Coalcomán, *Hinton 12719*, 5 Dec. 1938 (GH).

45. **Tephrosia platyphylla** (Rose) Standl.

Cracca platyphylla Rose, Contr. U. S. Nat. Herb. **12:** 270. fig. 25. 1909. Dry hillsides in pine woods between Mascota and San Sebastián, Jalisco, Mexico, *E. W. Nelson 4062*, 14 Mar. 1897 (US 327035-Type; NY-photograph).

Tephrosia platyphylla (Rose) Standl. Field Mus. Publ. Bot. **4:** 214. 1929.

Stiffly erect suffrutescent perennial 2–6 dm. high; stems from woody crowns, clustered, sulcate, angled. Stems, petioles, and axes of inflorescences densely covered with short fine twisting cinereous to tawny or rusty hairs, soft to touch. Leaves ascending, 4–13 cm. long, the petioles 3–12 mm. long; stipules triangular, oblong or lanceolate, 10 mm. or less long, persistent; leaflets 1 or occasionally 3, elliptic to oblong-elliptic, oval or obovate, the base obtuse to subcordate, the apex rounded, obtuse or retuse, mucronulate, principally (3.3–)4–11.5 cm. long, (2–)2.5–6.5 cm. wide, the paired leaflets when present much smaller than the terminal; leaflets coriaceous, very veiny, the veins impressed above, densely short-strigose with soft flexuous tawny hairs above, appearing silky or woolly, becoming glabrous and shining with age, densely short-tomentose beneath with fine tangled whitish to tawny hairs, hirsutulous along the midrib and principal lateral veins, the margins undulate, often subcrenate or rolled under; petiolules 1–3 mm. long, inconspicuous. Inflorescences terminal, compact, short, 4–8 cm. long, the stout peduncle 1.5–5 cm. long, sometimes bearing 1 or 2 sterile bracts, the flowering nodes 3– ca. 10; buds apparently 2 or 3 at a node. Bracts ovate to nearly circular, gradually acuminate, usually abruptly narrowed at the base, 9–16 mm. long, 4–8 mm. wide, crowded, caducous, glabrous within, densely lanate without. Pedicels 10–12 mm. long, ascending. Dried flowers ca. 20 mm. long. Calyx 10–17 mm. long, densely covered with short tangled hairs and with longer ascending white or (along the margins) rusty hairs ca. 2 mm. long, appearing woolly, the tube ca. 5–6 mm. long, the lobes acuminate, the upper lobes subulate to lanceolate, 5–9 mm. long, the lateral lanceolate, 8–12 mm. long, the lowermost ovate-lanceolate, 9–13 mm. long, 5–6 mm. wide. Corolla "rich rose-red" (Nelson) or "purple" (Mexia); blade of the banner suborbicular, ca. 17–20 mm. high, ca. 21 mm. broad, densely hairy on the back, the claw ca. 6 mm. long; wings ca. 19 mm. long, 8 mm. wide, slightly auricled, the claw 3 mm. long; keel ca. 18 mm. long, 8 mm. deep, with a small basal auricle, the claw 4.5 mm. long. Staminal tube 13–15 mm. long, the vexillary stamen coherent with the tube, free at the base, broad and flattened on the upper side. Ovary ca. 12 mm. long, densely hirsutulous with ascending tawny hairs; ovules ca. 7. Legume and seeds not seen.

Distribution. Open oak and pine forests, mountains in the region of San Sebastián, western Jalisco, Mexico. Map 20.

Specimens examined. MEXICO. Jalisco: Dry hillside in pine woods, roadside between Mascota and San Sebastián, *Nelson 4062*, 14 Mar. 1897 (US); dry, open, oak and pine woods, trail to Tranquillas, Real Alto, Sierra Madre Occidental, 2500 m., *Mexia 1716*, 19 Feb. 1927 (A, CAS, DS, GH, MO, NY, UC, US).

The large, coriaceous, usually unifoliolate leaves and the large, densely hairy calyx without bracteoles are quite characteristic. *Tephrosia platyphylla*, presumably most closely related to *T. diversifolia*, is the most highly modified of the species with few, large, coriaceous leaflets. In this species the reduction of leaflets to one (or three on large plants), of the number of nodes of the inflorescence, of the number of buds at a node, and of size and woodiness of plant seem to have accompanied one another.

Introduced Species

The exotic species naturalized in the Americas, chiefly in the West Indies, include at least *Tephrosia grandiflora, T. candida*, **T. noctiflora* and **T. purpurea.* In addition *T. Vogelii* and **T. villosa* have been tested as cover-crops and may be expected to escape from cultivation. Of the barbistyled species only *T. candida* and *T. grandiflora* seem to have become naturalized to any extent. *Tephrosia Vogelii* and *T. bracteolata* are known to me only from one old collection each, and are consequently regarded only as waifs. At least one other species, the African **T. linearis* (Willd.) Pers. (*Cracca hypoleuca* Rydb., *Indigofera Perriniana* Spreng.), is also known as a casual adentive in the New World.

46. **Tephrosia grandiflora** (L'Hér. ex Ait.) Pers.

Galega rosea Lam. Dict. **2:** 599. 1786, not *Tephrosia rosea* F. Muell. ex Benth. 1864. Seen by Lamarck in the garden of M. Cels in August, 1786, and believed by him to have come from Africa.

Colinil rosea (Lam.) Hitchc. Mo. Bot. Gard Rep. **4:** 75. 1893.

Galega grandiflora L'Hér. ex Ait. Hort. Kew. **3:** 70. 1789. "Native of the Cape of Good Hope. Mr. *Fr. Masson.* Introduced 1774." Attributed in synonymy to L'Héritier, Stirp. Nov. **2:** pl. 44, which was never published. According to Forbes (1948, p. 992), the type-specimen, *Aiton*, cult. Hort. Kew., is non-extant.

Tephrosia grandiflora (L'Hér. ex Ait.) Pers. Syn. Pl. **2:** 329. 1807. Basonym mistakenly attributed to Vahl, 1790, who cited Aiton.

Apodynomene grandiflora (L'Hér. ex Ait.) E. Mey. Comm. Pl. Afr. Austr. 111. 1836. Based on *T. grandiflora* (L'Hér. ex Ait.) Pers.

Cracca grandiflora (L'Hér. ex Ait.) Kuntze, Rev. Gen. **1:** 175. 1891. Basonym incorrectly attributed to Vahl.

Apodynomene Meyeri C. Presl, Bot. Bemerk. 57. 1844. Based on *A. grandiflora* E. Mey. which Presl believed to differ from true *Tephrosia grandiflora*, although Meyer clearly indicated the nomenclatural basis of the name. Neither description is diagnostic.

Woody perennial 5–6 dm. high from a slender tap-root with numerous branches, or a shrubby plant 2 m. high; stems erect, monopodial with axillary branches 6–20 cm. long, often woody below, the bark buff-colored, the stems often dark above. Stems, petioles and rachises strigillose with fine white or rusty hairs. Leaves 3–8 cm. long, the petiole 4–18 mm. long, usually shorter than the lowermost leaflets, the rachis 1.5–6.5 cm. long; stipules ovate, acuminate, 5–10 mm. long, 3–5 mm. wide, persistent, conspicuous, reddish or brownish, 9–13-veined, sparsely strigillose; leaflets of the principal leaves 9–15, oblanceolate to oblong, the base acute, the apex obtuse, mucronate or weakly cuspidate, 10–20(–24) mm. long, 3–4.5(–7) mm. wide, glabrous above, dull, strigillose beneath with whitish hairs, the veins often purplish on both surfaces, the leaflets somewhat conduplicate; petiolules 1–2 mm. long, densely strigillose with brown hairs. Inflorescences terminating main and axillary branches, erect, naked, short-peduncled, exceeding the leaves, (1–)2–9 cm. long, the flowering portion 0.5–2 cm. long with 3–5 crowded flowering nodes, the nodes buttressed; buds 3 at a node, 2 of these developing, flowering and fruiting, the third rudimentary. Primary bracts 2 cm. or less long, large, broadly ovate, acuminate, spathaceous, ca. 18-veined, reddish, deciduous before anthesis; secondary bracts absent. Pedicels 6–12 mm. long, ascending, strigillose. Dried flowers 20–22 mm. long. Calyx 5–6 mm. long, strigillose with fine rusty hairs, the upper lobes subulate, almost completely fused together, 1.5–2 mm. long, the lateral lobes deltoid-subulate, 3–3.5 mm. long, the lowermost linear-subulate, 4–5.5 mm. long. Corolla rose, the back of the banner orange, densely covered with fine rusty hairs; blade of the banner nearly orbicular, 16–18 mm. broad, tapering into a claw ca. 3 mm. long; wings ca. 22 mm. long, 8 mm. wide, exauriculate, the claw 3 mm. long; keel shallow, slightly beaked, 17–20 mm. long, the claw 3 mm. long. Staminal tube ca. 17 mm. long, the vexillary stamen coherent with the tube, broadened and thickened near the free base. Ovary rusty-hirtellous along both sutures, otherwise glabrous, the style barbate. Legumes straight, short-beaked, obliquely acute at either end, 4.5–5.5 cm. long, 8–9 mm. wide, horizontal or ascending, hirtellous along both sutures, the valves glabrous; seeds 9–16, ovoid, slightly compressed, 3.6–3.8 mm. long, 2.2–2.4 mm. wide, brown or black, the hilum near one end so that the long axis of the seed crosses the pod. Somatic chromosomes 22. Flowering collections throughout the year.

Distribution. Native of South Africa; naturalized in Jamaica.

Specimens examined. JAMAICA. Without locality, *Hart 524* (US); Blue Mts., St. Andrew near Cinchona, *Perkins 1017* (GH); rocky banks, vicinity of Cinchona, *Britton 210* (NY); dry slopes, Cinchona, *Shreve*, 1903 (NY); vicinity of Cinchona, trail to St. Helen's Gap, *A. Taylor 4237* (NY); Cinchona, 5000 ft., *Clute 188* (NY, PH, US); vicinity of Cinchona, 1550 m., *Killip 163* (US); partially shaded rocky bank, Cinchona, 1500 m., *Maxon 2598* (US); leeward slopes, Cinchona, Blue Mts., *Harris & Lawrence C1597* (NY, US); open brushy slope, vicinity of St. Helen's Gap, St. Andrew, 1475 m., *Maxon & Killip 565* (GH, US); edge of thicket by trail

near St. Helen's Gap, Blue Mt. range, 4780 ft., *Chrysler 1873* (PENN); open slopes, Flamstead and vicinity, Fort Royal Mts., 1000–1100 m., *Maxon 8656* (US); dry hillside, Whitefield Hall, St. Thomas Parish, Surrey, *Hunnewell & Griscom 14323* (GH); Whitefield Hall, *G. Collins 77* (US); Abbey Green, *Orcutt 3235* (UC, US).

Tephrosia grandiflora is easily recognizable by the large, rose-colored flowers, the ovate, acuminate stipules and the spathe-like, reddish or brownish primary bracts. The large, promptly deciduous bracts and broad stipules were largely the basis of the segregate genus *Apodynomene* E. Mey. of which this is the type-species. Although stipules and bracts of this kind characterize a group of South African species, and the absence of secondary bracts is indeed anomalous, there seem to be no real reasons for separating this group as a distinct genus. The sectional rank accorded it by Harvey (1861, p. 203), who contrasted it with *Eutephrosia* with narrow bracts and stipules, may possibly prove to be a more reasonable disposition.

47. **Tephrosia candida** DC.

Robinia candida Roxb. Cat. Hort. Calc. 56. 1814, nomen; DC. Prodr. **2:** 249. 1825, as synonym.

Tephrosia candida DC. Prodr. **2:** 249. 1825. Seen by DC. in Herb. Wallich, the specimen from Calcutta Gardens.

Robinia candida Roxb. Fl. Ind. **3:** 327. 1832. ". . . first reared in the Company's Botanic garden, from seed collected in the north of Bengal by Dr. Carey."

Xiphocarpus candidus (DC.) Endl. Gen. 1273. 1840; Zoll. & Mor. Nat. en Geneesk. Arch. Néerl. Indie. **3:** 76. 1846.

Kiesera candida Reinw. Syll. Pl. Nov. **2:** 11. 1828.

Kiesera sericea Reinw. ex Blume, Cat. Gew. Buitenz. 93. 1823, nomen; Reinw. Syll. Pl. Nov. **2:** 11. 1828.

Robinia sericea Sieber, Fl. Mart. Exsicc. no. 181; C. Presl, Symb. Bot. **1:** 14. 1832, as synonym.

Xiphocarpus martinicensis C. Presl, Symb. Bot. **1:** 14. pl. 7. 1832. Martinique, *Kohaut*. (Undoubtedly an introduced specimen.)

Shrub 1–3 m. high; branches angled, striate or sulcate. Branches, petioles, rachises, petiolules and axes of inflorescences strigillose to short-strigose or hirtellous to hirsutulous with golden or tawny hairs. Principal leaves 5–22 cm. long, the petioles 6–20 mm. long, the rachis 3.5–14 cm. long; stipules linear-subulate, ca. 5–10 mm. long, persistent; leaflets of the principal leaves (13–)17–27, lance-oblong to linear-oblong or oblong, the base acute, the apex acute and cuspidate, 1.5–7 cm. long, 6–13 mm. wide, firm, green, glabrous or with a few scattered minute hairs ca. 0.2 mm. long above, pale beneath, moderately strigillose to strigose or hirtellous to

hirsutulous with soft cinereous to golden hairs, silky or lustrous; petiolules 2–3 mm. long, slender, conspicuous. Inflorescences usually short, dense, terminal and in the upper axils, the terminal flower-bearing portion 2–19 cm. long, 1 or 2 nodes often with leaves, the axillary inflorescences often reduced to dense clusters in the axils, the flowering nodes 5–35; buds ca. 5–10 at a node, 3–6 flowering, 1 or 2 fruiting. Primary bracts subulate, 4–7 mm. long, caducous; secondary bracts ca. 3 mm. long, caducous. Pedicels 8–15 mm. long, strigillose to hirtellous. Dried flowers 23–26 mm. long. Calyx 4–5 mm. long, strigillose to hirtellous with rusty hairs, the tube ca. 4 mm. long, the upper lobes nearly obsolete, rounded, blunt, with a very broad, shallow sinus 0.5–1 mm. deep between them, the lateral lobes rounded-ovate, abruptly and minutely acuminate, 1.5–2 mm. long, the lowermost lobe ovate, 2–3 mm. long. Corolla white; blade of the banner broadly obovate, 20–22 mm. high and wide, finely short-strigose on the back, the broad claw 3–4 mm. long; wings 24–25 mm. long, 10–12 mm. wide, the claw 3 mm. long, exauriculate; keel 22–24 mm. long, 10–11 mm. deep, the claw 3.5–4 mm. long. Staminal tube 18–20 mm. long, the vexillary stamen coherent with the tube, free at the base, with a conspicuous callosity on the upper side near the base. Ovary densely strigillose, the style barbate. Legumes linear, 6–9 cm. long, 7–9 mm. wide, both strigillose and strigose or hirtellous and hirsutulous with rusty or tawny hairs, often silky but not appearing conspicuously hairy, brown; seeds 10–13, compressed, 3.2–3.6 mm. wide, brown to gray variegated with black, with a conspicuous white caruncle ca. 1 mm. high excentrically placed.

Distribution. Native of India; naturalized in Jamaica and apparently in Suriname, Venezuela and Colombia, possibly escaping from cultivation in Puerto Rico, Dominica, St. Kitts and Brazil.

Specimens examined. JAMAICA. Bush 3 m. high, Swift River, Hope, 160 m., *Harris 6031*, 1895 (NY); river banks, 480 ft., near Castleton, *Harris 9040*, 1905 (NY, US); gravelly river course, Castleton, 500 ft., *Harris 11804*, 1914 (CAS, F, GH, NY, US); hillside, Maryland, vicinity of Newcastle, *Britton 3292*, 1908 (NY); Golden Spring, 235 m., *Fawcett 7988*, 1900 (F, NY, US).

PUERTO RICO. Hacienda Carmelita, Ponce, 500 m., (introduced?), *Sargent 3118*, 1943 (US); planted south of Carolina, *Britton & Britton 9949*, 1932 (NY).

DOMINICA. Without locality, *Fairchild 2721*, 1932 (US).

ST. KITTS. Belmont Estate, *Britton & Cowell 411*, 1901 (NY, US).

HONDURAS. Cultivated, Lancetilla Valley, near Tela, Dept. Atlantida, 20–60 m., *Standley 53646*, 1927–28 (US).

COLOMBIA. Antioquia: Laguna de Guarne, *Bro. Daniel 2758*, 1942 (US). Valle del Cauca: North of Palmira (Cauca valley), 1050 m., *Garcia B. 6487*, Dec. 1938–Jan. 1939 (US).

VENEZUELA. Carabobo: Valencia, "grows wild but is cultivated," *Archer 311*, 1935 (US).

SURINAME. Scotelweg, *Archer 2665*, 1934 (F, US); Sandrij Island, "cultivated cover crop, but also said to be wild in bush," *Archer 2755*, 1934 (US).

BRAZIL. SAÕ PAULO: Fazenda Sta. Elisa, Campinas, *Houk & Santoro 534*, 1936 (US).

The large flowers, the almost completely fused upper lobes of the calyx, the narrow bracts and the large legumes and seeds are characteristic of this handsome species which appears to be spreading in tropical America. Two pubescence-forms, which seem to represent normal variations in wild Asiatic populations (as represented by herbarium-specimens), occur in the Americas. In one (e. g., all specimens from Jamaica and St. Kitts) the pubescence of the entire plant is appressed. In the second (e.g., specimens from Puerto Rico and Dominica), the stems, petioles and rachises are hirtellous and the leaves softly hirtellous to hirsutulous beneath. The hairs on the legumes of the former are appressed, those on the legumes of the latter spreading.

48. **Tephrosia Vogelii** Hook. f.

Tephrosia Vogelii Hook. f. Niger Fl. 296. 1849. "On the Quorra [Nigeria], and Fernando Po, *Vogel*."

Cracca Vogelii (Hook. f.) Kuntze, Rev. Gen. **1:** 175. 1891.

This species, a native of tropical Africa, is represented in America by an old specimen marked "West Indies—M. Perrin," (NY). This probably represents an early introduction of the species, but not necessarily an escape from cultivation. *Tephrosia Vogelii* has been grown as an ornamental shrub and as a cover-crop in tropical Africa and southeastern Asia and is a well-known fish-poisoning plant. It is being cultivated in tropical America and may escape from cultivation. The only other American specimen I have seen is from Honduras: Cultivated, Lancetilla Valley, near Tela, Dept. Atlantida, 20–60 m., *Standley 53459*, 1927–28 (US). The species is probably related to *T. candida*, but is easily recognized by the large, white flowers 35 mm. long, by the large calyx with oblong lateral lobes, by the pods 10–12 cm. long, 13 mm. wide and densely hirsute with soft, tawny hairs, and by the compressed black seeds about 6–7 mm. long and 4–4.5 mm. wide with a prominent white caruncle.

49. **Tephrosia bracteolata** Guill. & Perr.

Tephrosia bracteolata Guill. & Perr. Fl. Seneg. Tent. 194. 1830. Lam Sar, near St. Louis, Senegambia.

Cracca bracteolata (Guill. & Perr.) Kuntze, Rev. Gen. **1:** 174. 1891.

Tephrosia bracteolata is known in our area from a single specimen from the herbarium of R. T. Lowe, and now in the Gray Herbarium. It was collected in "Santo Domingos", 29 January 1866. In the absence of other information this species should be regarded as a stray introduction and not as an established member of the American flora. The plant is easily distinguished from other species known from the Americas by its 11–15 linear leaflets which are 2–6 cm. long, 2–4 mm. wide, obtuse to retuse at the apex, glabrous above and densely strigillose beneath, by the slender, few-flowered racemes inserted obliquely in the axils, by the small flowers 10–12 mm. long, by the strigillose calyx 2 mm. long, and by the hirtellous legume 4.5 cm. long and 4 mm. wide. A more complete description is to be found in Rydberg, N. Amer. Fl. **24:** 182. 1923. I have seen no authentic material of this species and am not convinced that this identification is correct.

Excluded Glabrous-styled Tephrosias

The following list is composed of names which have been applied to American glabrous-styled species of *Tephrosia*. The synonymy given is primarily nomenclatural with but a few taxonomic references in connection with species with which I am familiar.

Tephrosia adscendens Benth. in Mart. Fl. Bras. **15**(1): 48. 1859.

Tephrosia adunca Benth. Ann. Nat. Hist. I. **3**: 432. 1839. *Cracca adunca* (Benth.) Kuntze, Rev. Gen. **1**: 174. 1891. *Tephrosia adunca* var. *genuina* Hassl. in Fedde, Rep. Spec. Nov. **16**: 165. 1919.

Tephrosia adunca var. acutifolia Chod. & Hassl. Bull. Herb. Boiss. II. **4**: 839. 1904.

Tephrosia adunca var. genuina f. pseudo-marginata Hassl. in Fedde, Rep. Spec. Nov. **16**: 165. 1919.

Tephrosia adunca var. guaranitica (Chod. & Hassl.) Hassl. in Fedde, Rep. Spec. Nov. **16**: 165. 1919. *Tephrosia guaranitica* Chod. & Hassl.

Tephrosia adunca var. intermedia Chod. & Hassl. Bull. Herb. Boiss. II. **4**: 839. 1904.

Tephrosia adunca var. intermedia f. glabrior Chod. & Hassl. Bull. Herb. Boiss. II. **4**: 1904.

Tephrosia adunca var. rufescens (Benth.) Hassl. in Fedde, Rep. Spec. Nov. **16**: 165. 1919. *Tephrosia rufescens* Benth.

Tephrosia adunca var. rufescens f. grandifolia Hassl. in Fedde, Rep. Spec. Nov. **16**: 165. 1919.

Tephrosia adunca var. rufescens f. paraguayensis (Ulbr.) Hassl. in Fedde, Rep. Spec. Nov. **16**: 165. 1919. *Tephrosia rufescens* var. *paraguayensis* Ulbr.

Tephrosia adunca var. subglabrata Hassl. in Fedde, Rep. Spec. Nov. **16**: 165. 1919.

Tephrosia ascendens Macfadyen, Fl. Jamaica **1**: 257. 1837. = *T. purpurea* (L.) Pers.?

Tephrosia angustissima Shuttlew. ex. Chapm. Fl. Southern U. S. 96. 1865, not Engl. Bot. Jahrb. **10**: 29. 1888. *Cracca angustissima* (Shuttlew. ex Chapm.) Kuntze, Rev. Gen. **1**: 174. 1891 *Tephrosia purpurea* var. *angustissima* (Shuttlew. ex Chapm.) B. L. Robinson.

Cracca benensis Rusby, Mem. N. Y. Bot. Gard. **7**: 262. 1927.

Tephrosia Brandegei (Standl.) Riley, Kew Bull. **1923**: 339. 1923. *Cracca Brandegei* Standl. Contr. U. S. Nat. Herb. **20**: 217. 1919.

Tephrosia brevipes Benth. Ann. Nat. Hist. I. **3**: 432. 1839. *Cracca brevipes* (Benth.) Kuntze, Rev. Gen. **1**: 174. 1891. = *Tephrosia sessiliflora* (Poir.) Hassl.

Tephrosia cathartica (Sessé & Moc.) Urb. Symb. Ant. **4**: 283. 1905. *Galega cathartica* Sessé & Moc. Fl. Mex. ed. 2. 175. 1894. *Cracca cathartica* (Sessé & Moc.) Britt. & Millsp. Bahama Fl. 181. 1920. = *Tephrosia Senna* HBK.

Tephrosia cinerea (L.) Pers. Syn. Pl. **2**: 328. 1807 *Galega cinerea* L. Syst. Nat. ed. 10. **2**: 1172. 1759. *Cracca cinerea* (L.) Morong, Ann. N. Y. Acad. Sci. **7**: 79. 1892. *Colinil cinereum* (L.) Hitchc. Mo. Bot. Gard. Rep. **4**: 75. 1893. *Tephrosia cinerea* var. *typica* Hassl. in Fedde, Rep. Spec. Nov. **16**: 166. 1919.

Tephrosia cinerea β littoralis (Jacq.) Benth. in Mart. Fl. Bras. **15**(1): 48. July 1859. *Tephrosia cinerea β littoralis* (Jacq.) Griseb. Fl. Br. W. Ind. 182. 1859 (probably latter half of year). = *T. cinerea* (L.) Pers.

Tephrosia cinerea var. typica f. pseudo-adunca Hassl. in Fedde, Rep. Spec. Nov. **16**: 166. 1919.

Tephrosia cinerea γ villosior Benth. in Mart. Fl. Bras. **15**(1): 48. 1859. = *T. cinerea* (L.) Pers.

Cracca corallicola Small, Bull. Torrey Club **36**: 160. 1909.

Cracca Curtissii Small ex Rydb. N. Amer. Fl. **24**: 179. 1923.

Tephrosia decumbens Benth. ex Benth. & Oerst. Kjoeb. Vidensk. Meddel. **1853**: 7. 1854. *Cracca decumbens* (Benth. ex Benth. & Oerst.) Kuntze, Rev. Gen. **1**: 175. 1891.

Tephrosia domingensis (Willd.) Pers. Syn. Pl. **2**: 330. 1807. *Galega domingensis* Willd. Sp. Pl. **3** (2): 1249. 1802. *Cracca domingensis* (Willd.) Rydb. N. Amer. Fl. **24**: 181. 1923. = *Tephrosia cinerea* (L.) Pers., at least sensu Rydb.

Tephrosia egregia Sandwith, Kew Bull. **1927**: 249. 1927.

Tephrosia guaranitica Chod. & Hassl. Bull. Herb. Boiss II. **4**: 879. 1904. *Tephrosia adunca* var. *guaranitica* (Chod. & Hassl.) Hassl.

Tephrosia gynothrix Miq. Linnaea **18**: 29. 1844. = *Tephrosia cinerea* (L.) Pers.

Tephrosia hassleri Chod. Bull. Herb. Boiss. II. **4**: 879. 1904; emend Hassl. in Fedde, Rep. Spec. Nov. **16**: 163. 1919.

Cracca hirta (Buch.-Ham.) Britton & Wilson, Sci. Surv. Porto Rico & Virgin Ids. **6**: 351. 1926. *Galega hirta* Buch.-Ham. Trans. Linn. Soc. **13**: 546. 1822. *Cracca hirta* sensu Britton & Wilson appears to be *Tephrosia noctiflora* Boj. ex Baker, but the plant described by Hamilton from India cannot be that species and from the description seems to be *Tephrosia villosa* (L.) Pers., a plant with very different calyx-lobes.

Cracca hypoleuca Rydb. N. Amer. Fl. **24**: 180. 1923, not *C. hypoleuca* (Boiss.) Alef. 1861, nor *Tephrosia hypoleuca* Riley, 1923. *Indigofera Perriniana* Spreng. Neue Entd. **2**: 161. 1821, not *Galega Perriniana* Spreng. l. c., nor *Cracca Perriniana* (Spreng.) Kuntze, Rev. Gen. **1**: 175. 1891, nor *Tephrosia Perriniana* (Spreng.) DC. Prodr. **2**: 261. 1825. Known from the New World only by a single collection sent to Sprengel by Perrin, presumably from the West Indies (NY). This seems to be the plant treated by Baker in Oliver, Fl. Trop. Afr. **2**: 120. 1871, as *Tephrosia linearis* (Willd.) Pers. and matches specimens cited by Baker. It should be regarded as nothing more than a waif in the Western Hemisphere.

Tephrosia leptostachya DC. Prodr. **2**: 251. 1825. *Cracca leptostachya* (DC.) Rusby, Mem. Torr. Club **3**(3): 18. 1893. The description of this species from Senegal could apply to any of several dozen species, and the name has been used for a number of plants both endemic and introduced in the Americas. I have not been able to determine the correct application of this name.

Tephrosia leptostachya β leptophylla Benth. in Mart. Fl. Bras. **15**(1): 49. 1859.

Tephrosia linearis (Willd.) Pers. Syn. Pl. **2**: 330. 1807. *Galega linearis* Willd. Sp. Pl. **3**(2): 1248. 1802. See *Cracca hypoleuca* Rydb.

Tephrosia littoralis (Jacq.) Pers. Syn. Pl. **2**: 329. 1807. *Vicia littoralis* Jacq. Enum. Pl. Carib. 27. 1760. *Galega littoralis* (Jacq.) L. Syst. Nat. ed. 12. **2**: 497. 1767. *Cracca littoralis* (Jacq.) Rydb. N. Amer. Fl. **24**: 178. 1923. *Tephrosia cinerea β littoralis* (Jacq.) Benth. *Tephrosia cinerea β littoralis* (Jacq.) Griseb. = *Tephrosia cinerea* (L.) Pers.

Tephrosia marginata Hassl. in Fedde, Rep. Spec. Nov. **16**: 162. 1919.

Tephrosia marginata var. cinerascens Hassl. in Fedde, Rep. Spec. Nov. **16**: 163. 1919.

Tephrosia marginata var. pseudo-rufescens Hassl. in Fedde, Rep. Spec. Nov. **16**: 163. 1919.

Tephrosia nervosa Chod. & Hassl. Bull. Herb. Boiss. II. **4**: 839. 1904.

Tephrosia noctiflora Boj. ex Baker in Oliver, Fl. Trop. Afr. **2**: 112. 1871. *Cracca noctiflora* (Boj. ex Baker) Kuntze, Rev. Gen. **1**: 175. 1891. *Cracca hirta* (Buch.-Ham.) Britton & Wilson, Sci. Surv. Porto Rico & Virgin Ids. **6**: 351. 1926, as to plant, not basonym (*Galega hirta* Buch.-Ham. = *Tephrosia villosa* (L.) Pers.?). Naturalized in the West Indies from Africa.

Tephrosia penicillata Benth. Ann. Nat. Hist. I. **3**: 431. 1839. = *Tephrosia adunca* Benth. according to Benth. in Mart. Fl. Bras. **15**(1): 47. 1859.

Tephrosia piscatoria (Ait.) Pers. Syn. Pl. **2**: 329. 1807. *Galega piscatoria* Ait. Hort. Kew. ed. 1. **3**: 71. 1789. *Cracca piscatoria* (Ait.) Lyons, Pl. Names Scientific & Popular 120. 1900, basonym attributed to Solander. The habitat was said in the original description to be "India orientali et ins. Maris pacifici." This name has been applied to native American plants which bear little resemblance to the species described.

Tephrosia Perriniana (Spreng.) DC. Prodr. **2**: 251. 1825. *Galega Perriniana* Spreng. Neue Entdeck. **2**: 161. 1821. *Cracca Perriniana* (Spreng.) Kuntze, Rev. Gen. **1**: 175. 1891. Not *Indigofera Perriniana* Spreng. nor *Cracca hypoleuca* Rydb. Said by Sprengel to be related to *Galega domingensis* Willd., but the description completely inconclusive. This may not be a *Tephrosia* at all. Probably from South America.

Tephrosia procumbens Macfadyen, Fl. Jamaica **1**: 256. 1837. = *T. cinerea* (L.) Pers.

Tephrosia purpurea (L.) Pers. Syn. Pl. **2**: 329. 1807. *Cracca purpurea* L. Sp. Pl. ed. 1. **2**: 752. 1753. *Galega purpurea* L. Syst. Nat. ed. 10. **2**: 1172. 1759. Introduced from India and naturalized on beaches and sandy disturbed soils in Jamaica, Hispaniola, Dominica, Martinique, Barbados and Trinidad. The plant described by Linnaeus appears to be this species with 11–19 relatively large yellowish-green, cuneate-oblong, cuneate or obovate leaflets, rather coarse, often erect habit, staminal tube 5–5.5 mm. long, and legumes with 5–7 seeds, characters which distinguish it from *Tephrosia cinerea* and *T. Senna* with which it is often confused. (See GH-photograph of Type, *Galega*, Sheet no. 7, in Herb. L.) This plant appears to be the same as that described as *T. Wallichii* Graham ex Fawcett & Rendle. Although *T. purpurea* is assigned a pan-tropical distribution by many authors, a number of species are involved.

Tephrosia purpurea var. angustissima (Shuttlew. ex Chapm.) B. L. Robinson, Bot. Gaz. **28**: 201. 1899. *T. angustissima* Shuttlew. ex Chapm.

Tephrosia rufescens Benth. Linnaea **22**: 513. 1849. *T. adunca* var. *rufescens* (Benth.) Hassl.

Tephrosia rufescens var. paraguayensis Ulbr. in Fedde, Rep. Spec. Nov. **2**: 12. 1906. *T. adunca* var. *rufescens* f. *paraguayensis* (Ulbr.) Hassl.

Cracca Rusbyi Rydb. N. Amer. Fl. **24**: 181. 1923.

Cracca Schottii Vail, Bull. Torr. Cl. **22**: 25. 1895. = *Tephrosia Senna* HBK.

Tephrosia scopulorum Brandeg. Univ. Calif. Publ. Bot. **6**: 181. 1915. = *T. cinerea* (L.) Pers.

Tephrosia Senna HBK. Nov. Gen. et Sp. (folio) **6**: 359. Aug. 1824. Op. cit. (quarto) **6**: 458. Sept. 1824. *Cracca Senna* (HBK.) Kuntze, Rev. Gen. **1**: 175. 1891. Collected by Humboldt and Bonpland on the Cauca River near Buga, Valle del Cauca, Colombia, Oct. 1801. The detailed description clearly applies to the plant which has been known as *Tephrosia cathartica* (Sessé & Moc.) Urb., and Mr. E. P. Killip writes me that he has examined the Type at Paris and that it is indeed this species.

Tephrosia sessiliflora (Poir.) Hassl. in Fedde, Rep. Spec. Nov. **16**: 162. 1919. *Cytisus sessiliflorus* Poir. in Lam. Encycl. Suppl. **2**: 439. 1811. *Rhynchosia sessiliflora* (Poir.) DC. Prodr. **2**: 389. 1825. *Tephrosia brevipes* Benth. This species is quite unlike any other American member of the genus. The circumscissile calyx, entirely axillary flowers, 1–3 leaflets and glabrous styles set it apart from all other species in our region. It is known from Oaxaca, Mexico, (Guatulco, *Liebmann 5165*, Oct. 1843, F-fragment ex Herb. Bot. Mus. Copenhagen), Haiti, Trinidad, Venezuela, British Guiana, Brazil and Paraguay.

Tephrosia tenella A. Gray, Pl. Wright. **2**: 36. 1853. *Cracca tenella* (A. Gray) Rose, Contr. U. S. Nat. Herb. **12**: 271. 1909.

Tephrosia venustula HBK. Nov. Gen. et Sp. (folio) **6**: 360. Aug. 1824; Op. cit. (quarto) **6**: 459. Sept. 1824. According to Bentham in Mart. Fl. Bras. **15**(1): 47. 1859, this is *Tephrosia cinerea* (L.) Pers.

Tephrosia vicioides Schlecht. Linnaea **12**: 297. 1838, not A. Rich. 1847. *Cracca vicioides* (Schlecht.) Kuntze, Rev. Gen. **1**: 175. 1891.

Tephrosia villosa (L.) Pers. Syn. Pl. **2**: 329. 1807. *Galega villosa* L. Syst. Nat. ed. 10. **2**: 1172. 1759. *Cracca villosa* L. Sp. Pl. ed. 1. **2**: 752. 1753. Known to me only from cultivated specimens in the Americas.

Cracca villosa δ cinerea (L.) Kuntze, Rev. Gen. **1**: 173. 1891. = *Tephrosia cinerea* (L.) Pers.

Tephrosia Wallichii Graham ex Fawcett & Rendle, Jour. Bot. **55**: 35. 1917. *Cracca Wallichii* (Graham ex Fawcett & Rendle) Rydb. N. Amer. Fl. **24**: 180. 1923. = *Tephrosia purpurea* (L.) Pers., introduced into the West Indies.

Species Excluded from Tephrosia

Tephrosia amorphaefolia Kunth & Bouché, Ann. Sci. Nat. III. **7**: 189. 1847. Unknown to me.

Tephrosia aniloides Bello, Anal. Soc. Esp. Hist. Nat. **10**: 258. 1881. *Cracca aniloides* (Bello) Cook & Collins. = *Cracca caribaea* (Jacq.) Benth.

Tephrosia astragalina HBK. Nov. Gen. et Sp. (quarto) **6**: 464. Sept. 1824; Op. cit. (folio) **6**: 363. Sept. 1824. *Cracca astragalina* (HBK.) Kuntze, Rev. Gen. **1**: 174. 1891. Not *Tephrosia*.

Tephrosia Barclayi Baillon, Bull. Soc. Linn. Paris **1**: 388. 1883. According to Rydberg, N. Amer. Fl. **24**: 183. 1923, this is a species of *Dalbergia*.

Cracca bicolor Micheli, Bull. Herb. Boiss. **2**: 444. pl. 11. 1894. = *Cracca Benth.*

Crafordia bracteata Raf. Specchio **1**: 156. 1814. Although this name is usually assigned to the synonymy of *Tephrosia spicata* (Walt.) T. & G., the plant described by Rafinesque from the Susquehannah River, Pennsylvania, United States, cannot possibly be a *Tephrosia;* the description certainly does not apply to any species of the genus in the United States.

Tephrosia caribaea (Jacq.) DC. Prodr. **2**: 251. 1825. *Galega caribaea* Jacq. Sel. Stirp. Am. 212. 1763. *Cracca caribaea* (Jacq.) Benth. ex Benth. & Oerst. Kjoeb. Vidensk. Meddel. **1853**: 9. 1854. = *Cracca* Benth.

Cracca caribaea var. Edwardsii (Gray) Hassl. in Fedde, Rep. Spec. Nov. **16**: 160. 1919. = *Cracca* Benth.

Cracca caribaea var. glandulifera Hassl. in Fedde, Rep. Spec. Nov. **16**: 160. 1919. = *Cracca* Benth.

Cracca caribaea var. glandulifera f. dubia Hassl. in Fedde, Rep. Spec. Nov. **16**: 160. 1919. = *Cracca* Benth.

Tephrosia chilensis Trev. Linnaea **10**: Litt. 73. 1836. Grown from seeds supposedly from Chile. No Tephrosias are known to me from that region and the plant with 2-seeded pods described does not seem to be one.

Tephrosia coerulea Pers. Syn. Pl. **2**: 329. 1807. = *Dalea Mutisii* Kunth, according to Index Kewensis.

Cracca collina M. E. Jones, Contr. West. Bot. **15**: 137. 1929. = *Eriosema grandiflorum* (Schlecht. & Cham.) Seem. Bot. Voy. Herald 345. 1857. See Standley, Field Mus. Publ. Bot. **11**: 161. 1936.

Tephrosia constricta S. Wats. Proc. Amer. Acad. **24**: 46. 1889. *Cracca constricta* (S. Wats.) Tidestrom, Proc. Biol. Soc. Wash. **48**: 40. 1935. = *Sphinctospermum constrictum* (S. Wats.) Rose, Contr. U. S. Nat. Herb. **10**: 107. pl. 34. 1906, a monotypic genus separated morphologically and cytologically from *Tephrosia* and more closely allied to *Cracca* Benth.

Cracca corumbae Hoehne, Comm. Linh. Telegr. Estrat. Matto-Grosso (Publ. 45), Annexo 5, Bot. pt. 8: 63 (as Gracca), pl. 153. 1919. Unknown to me, but not *Tephrosia.*

Tephrosia craccoides Lillo, Bol. Mus. Cien. Nat. Univ. Tucuman, no. 6: 8. 1925, without Latin diagnosis and described merely as "Planta de tres a quatro metros de alto, de flor blanca." This is *Coursetia brachyrhachis* Harms (see Burkart 1943, p. 297).

Balboa diversifolia Liebm. Kjoeb. Vidensk. Meddel. **1853**: 106. 1854. "Habitat ad oram occidentalem Mexici (Dep. Oajaca) inter Chacalapa et S. Jago Estata," *Liebmann 4626*, Nov. 1842 (US). Although usually referred to the synonymy of *Tephrosia,* Liebmann clearly indicated this to be a member of the Tribe Phaseolae and probably most closely related to *Periandra* Mart. I have been unable to place this plant, but it certainly is not a *Tephrosia.*

Tephrosia dolichocarpa Griseb. Goett. Abh. **24**: 101. 1879. *Cracca dolichocarpa* (Griseb.) Kuntze, Rev. Gen. **1**: 175. 1891. Apparently known only from the Sierra de Cordoba in Argentina, this species is not a *Tephrosia.* I have not seen flowering specimens, but the inflorescence appears to be different from that of *Tephrosia* and the leaflets are stipellate, a feature unknown in *Tephrosia.*

Cracca Edwardsii A. Gray, Pl. Wright. **2**: 36. 1853. *Cracca caribaea* var. *Edwardsii* (A. Gray) Hassl. = *Cracca* Benth.

Cracca Edwardsii var. glabella A. Gray, Proc. Amer. Acad. **17**: 201. 1882. = *Cracca* Benth.

Cracca Edwardsii var. sericea A. Gray, Proc. Amer. Acad. **17**: 201. 1882. *Cracca sericea* A. Gray. = *Cracca* Benth.

Tephrosia? Elliottii (Nutt.) Benth. Ann. Wien. Mus. **2**: 127, in obs. 1838. = *Galactia Elliottii* Nutt.

Tephrosia filiformis (Jacq.) Pers. Syn. Pl. **2**: 328. 1807. *Galega filiformis* Jacq. Collect. **2**: 348. 1788. *Cracca filiformis* (Jacq.) Kuntze, Rev. Gen. **1**: 175. 1891. The plant illustrated by Jacquin is a species of *Galactia.*

Tephrosia fruticosa M. E. Jones, Extr. Contr. West. Bot. **18**: 43. 1933. The "flowers yellow and purple-veined," cannot apply to *Tephrosia.* Jones noted, "This may be an Eriosema." This plant was collected in the Barranca of Guadalajara where a shrubby *Eriosema* is a conspicuous element. See also Morton, Contr. U. S. Nat. Herb. **29**: 104. 1945.

Tephrosia frutescens (Mill.) DC. Prodr. **2**: 256. 1825. *Galega frutescens* Mill. Gard. Dict. ed. 8. *Galega* no. 3. 1768. *Cracca frutescens* (Mill.) Kuntze, Rev. Gen. **1**: 175. 1891. According to Britten and Baker, Jour. Bot. **35**: 225. 1897, this is *Indigofera mucronata* Spreng. ex DC.

Tephrosia glabrescens Benth. Bot. Voy. Sulph. 81. 1844. *Cracca glabrescens* Benth. ex Benth. & Oerst. Kjoeb. Vidensk. Meddel. **1853**: 9. 1854. = *Cracca* Benth.

TEPHROSIA GLANDULIFERA Benth. Bot. Voy. Sulph. 81. 1844. *Cracca glandulifera* Benth. ex Benth. & Oerst. Kjoeb. Vidensk. Meddel. **1853**: 8. 1854. = *Cracca* Benth. or *Coursetia glandulifera* (Benth.) Macbr.

CRACCA GREENMANNII Millsp. Field Col. Mus. Bot. Ser. **1**: 299. pl. 13. 1896. = *Cracca* Benth.

TEPHROSIA HETERANTHA Griseb. Goett. Abh. **24**: 101. 1879. *Cracca heterantha* (Griseb.) Kuntze, Rev. Gen. **1**: 175. 1891. *Cracca Kuntzei* Harms ex Kuntze. *Neocracca heterantha* (Griseb.) Spegazzini, Physis **8**: 119. 1925. A peculiar plant, apparently an aberrant member of or closely related to *Cracca* Benth. (see Burkart 1943).

CRACCA KUNTZEI Harms ex Kuntze, Rev. Gen. **3**(2): 69. 1898. *Neocracca Kuntzei* (Harms ex Kuntze) Kuntze, l. c. = *Cracca heterantha* (Griseb.) Kuntze or *Neocracca heterantha* (Griseb.) Spegazzini.

TEPHROSIA LONGIFOLIA (Jacq.) Pers. Syn. Pl. **2**: 328. 1807. *Galega longifolia* Jacq. Collect. **2**: 349. 1788. The plant illustrated by Jacquin is a species of *Galactia.*

CRACCA MICRANTHA Micheli in Dur. & Pitt. Bull. Soc. Bot. Belg. **30**(1): 286. 1891. *Benthamantha mollis* var. *macrantha* (Micheli) Standl. = *Cracca* Benth.

CRACCA MOLLIS (HBK.) Benth. & Oerst. Kjoeb. Vidensk. Meddel. **1853**: 9. 1854. *Tephrosia mollis* HBK. Nov. Gen. et Sp. (folio) **6**: 363. Sept. 1824; Op. cit. (quarto) **6**: 463. Sept. 1824, not *T. mollis* Valet. 1907. = *Cracca mollis* (HBK.) Benth. & Oerst. or *Coursetia mollis* (HBK.) Macbr.

TEPHROSIA MOSCHATA Tussac, Fl. Antill. **2**: 22. pl. 6. 1818. = *Corynella dubia* (Poir.) Urb.

TEPHROSIA? OCHROLEUCA (Jacq.) Pers. Syn. Pl. **2**: 329. 1807. *Galega ochroleuca* Jacq. Collect. **1**: 79. 1786. *Cracca ochroleuca* (Jacq.) Benth. & Oerst. Kjoeb. Vidensk. Meddel. **1853**: 9. 1854. = *Cracca* Benth. or *Coursetia ochroleuca* (Jacq.) Macbr.

TEPHROSIA OROBOIDES HBK. Nov. Gen. et Sp. (folio) **6**: 362. (not pl. 578.) Sept. 1824; Op. cit. (quarto) **6**: 462. (not pl. 578.) Sept. 1824. *Cracca oroboides* (HBK.) Kuntze, Rev. Gen. **1**: 175. 1891, as *orobodes.* = *Lotus oroboides* (HBK.) Ottley ex Kearney & Peebles, Jour. Wash. Acad. Sci. **29**: 483. 1939. (F-fragment of Type). (See Ottley, Brittonia **5**: 101. 1944.)

GALEGA POLYGAMA Sessé & Moc. Fl. Mexic. ed. 2. 174. 1894. Although described with **Galega cathartica* Sessé & Moc. and **G. cinerea*, this apparently is not *Tephrosia.* Described as having "folia ternata, foliolis ellipticis."

CRACCA PUMILA (Rose) M. E. Jones, Extr. Contr. West. Bot. **18**: 44. 1933. = *Cracca* Benth.

CRACCA SERICEA A. Gray, Proc. Amer. Acad. **19**: 74. 1893. = *Cracca* Benth.

TEPHROSIA STIPULARIS (Desv.) DC. Prodr. **2**: 254. 1825. *Brissonia stipularis* Desv. Jour. Bot. **1**: 74. 1814. *Cracca stipularis* (Desv.) Kuntze, Rev. Gen. **1**: 175. 1891. Apparently not a species of *Tephrosia.*

TEPHROSIA VELUTINA Spreng. Syst. **3**: 232. 1826. *Cracca velutina* (Spreng.) Kuntze, Rev. Gen. **1**: 175. 1891, not Rydb. 1923. This cannot be a species of *Tephrosia.* It was described as "Foliis ternatis . . . fruticosa volubilis, foliolis oblongis, . . ," etc.

TEPHROSIA VENOSA Mart. & Gal. Bull. Acad. Brux. **10**(2): 47. 1843. *Cracca venosa* (Mart. & Gal.) Kuntze, Rev. Gen. **1**: 175. 1891. This apparently is a species of *Cracca* Benth. The authors noted its relationship to *Tephrosia mollis* HBK. (= *Cracca mollis* (HBK.) Benth.)

LITERATURE CITED

ALEFELD, F. 1861. Ueber Vicieen. Bonplandia **9**: 116–131.

———. 1862. Namensanderung zweier Leguminosen-Gattung. Bonplandia **10**: 264.

ALLEN, CAROLINE K. 1945. Studies in the Lauraceae, VI. Preliminary survey of the Mexican and Central American species. Jour. Arnold Arb. **26**: 280–434.

ATCHISON, EARLENE. 1948. Studies in the Leguminosae. II. Cytogeography of Acacia (Tourn.) L. Amer. Jour. Bot. **35**: 651–655.
BAILEY, I. W. AND CHARLOTTE NAST. 1948. Morphology and relationships of Illicium, Schizandra and Kadsura I. Stem and Leaf. Jour. Arnold Arb. **29**: 77–89.
BAKER, E. G. 1926. Tephrosia *in* The Leguminosae of tropical Africa. Pt. I: 170–215. Ghent.
BENTHAM, G. AND A. OERSTED. 1854. Leguminosae Centroamericanae. Kjoeb. Vidensk. Meddel. **1853**: 1–19.
BRITTEN, J. AND E. G. BAKER. 1900. On some species of Cracca. Jour. Bot. **29**: 12–19.
————. 1900a. Cracca virginiana. Jour. Bot. **29**: 53.
BRIQUET, J. 1906. Règles internationales de la nomenclature botanique, ed. 1, Vienna, 1905. Jena.
————. 1912. Règles internationales de la nomenclature botanique, ed. 2, Brussels, 1910. Jena.
————. 1935. International rules of botanical nomenclature, ed. 3, Cambridge, 1930. Jena.
BROWNE, P. 1756. Civil and natural history of Jamaica. Ed. 1. London.
BURKART, A. 1943. Las leguminosas Argentinas silvestres y cultivadas. Buenos Aires.
CONSTANCE, L. 1949. A revision of Phacelia subgenus Cosmanthus (Hydrophyllaceae). Contr. Gray Herb. Harv. Univ. 168.
CROCKER, W. 1938. Life-span of seeds. Bot. Rev. **4**: 235–274.
DEAM, C. C. 1940. Tephrosia *in* Flora of Indiana. 601. Indianapolis.
DECANDOLLE, AUGUSTIN P. 1825. Tephrosia *in* Prodromus systematis naturalis regni vegetabilis **2**: 248–256. Paris.
DOMIN, K. 1926. Tephrosia *in* Beitrage zur Flora und Pflanzengeographie Australiens **1**(3): 187–286. (Biblioth. Bot. **23**: 741–840).
DUCKE, A. 1939. As leguminosas da Amazônia brasileira. Rio de Janeiro.
FASSETT, N. C. 1939. Tephrosia *in* Leguminous plants of Wisconsin. 57–63. Madison, Wisc.
FERNALD, M. L. 1943. Virginian botanizing under restrictions. RHODORA **45**: 357–413, 455–480, 485–511.
FORBES, HELENA M. L. 1948. A revision of the South African species of the genus Tephrosia Pers. Bothalia **4**: 951–1001.
GENTRY, H. S. 1942. Rio Mayo plants, a study of the flora and vegetation of the valley of the Rio Mayo, Sonora. Carnegie Inst. Wash. Publ. 527.
————. 1946. Notes on the vegetation of Sierra Surotato in northern Sinaloa. Bull. Torrey Club **73**: 451–462.
————. 1946a. Sierra Tacuichamona—a Sinaloa plant locale. Bull. Torrey Club **73**: 356–362.
GRENIER, CH. AND D. A. GODRON. 1848. Cracca *in* Flore de France **1**: 468–473. Paris.
GRIFFITH, R. E. 1847. Medical Botany. Philadelphia.
HARVEY, W. H. in HARVEY AND SONDER. 1861–1862. Tephrosia *in* Flora Capensis **2**: 203–211. Dublin.
HUSKINS, C. L. 1948. Chromosome multiplication and reduction in somatic tissues. Nature **161**: 80–83. 17 Jan.
KAWAKAMI, J. 1930. Chromosome numbers in Leguminosae. Bot. Mag. Tokyo **44**: 319–328.
KREUTER, E. 1929. Chromosomen-studien bei den Galegeen. Ber. der Deut. Bot. Gesell. **47**: 99–101.
————. 1930. Beitrag zur karyologisch-systematischen Studien an Galegeen. Plant. Arch. Wiss. Bot. **11**(1): 1–44.
KUNTZE, O. 1891. Brittonamra *and* Cracca *in* Revisio generum plantarum **1**: 164–165, 173–176. Würzburg.
LANJOUW, J. 1939. On the standardization of herbarium abbreviations. Chron. Bot. **5**: 142–150.

Lanjouw, J. 1941. Index herbariorum. Chron. Bot. **6**: 377–378.
Linnaeus, C. 1753. Cracca *in* Species plantarum **2**: 752.
———. 1759. Galega *in* Systema natura, ed. 10. **2**: 1172.
Little, V. A. 1942. Rotenone content, an inherited character in the roots of Devil's Shoestring, Tephrosia virginiana. Jour. Econ. Entomology **35**: 54.
McIndoo, N. E. 1945. Plants of possible insecticidal value—a review of the literature up to 1941. U. S. Bur. Entomology & Pl. Quarantine Publ. E-661. Washington.
Martin, A. C. 1946. The comparative internal morphology of seeds. Amer. Midland Nat. **36**: 513–660.
Persoon, C. H. 1807. Tephrosia *in* Synopsis plantarum **2**: 328–330. Paris.
Rafinesque, C. S. 1830. Medical flora, or manual of the medical botany of the United States of America. Philadelphia.
Rehder, A., C. A. Weatherby, R. Mansfeld and M. L. Green. 1935. Conservation of later generic homonyms. Kew Bull. **1935**: 341–544.
Roark, R. C. 1937. Tephrosia as an insecticide—a review of the literature. U. S. Bur. Entomology & Pl. Quarantine Publ. E-402. Washington.
Robinson, B. L. 1899. Revision of the North American species of Tephrosia. Bot. Gaz. **28**: 193–202.
Rydberg, P. A. 1923. Cracca *in* N. Amer. Fl. **24**(3): 157–183.
———. 1923a. Genera of North American Fabaceae I. Tribe Galegeae. Amer. Jour. Bot. **10**: 485–498. pls. 33–35.
Senn, H. A. 1938. Chromosome number relationships in the Leguminosae. Bibl. Genetica **12**: 175–336.
Sievers, A. F., G. A. Russell, M. S. Lowman, E. D. Fowler, C. O. Erlanson and V. A. Little. 1938. Studies on the possibilities of Devil's Shoestring (Tephrosia virginiana) and other native species of Tephrosia as commercial sources of insecticides. U. S. Dept. Agr. Tech. Bull. 595. Washington.
Sprague, T. A. 1940. Additional nomina generica conservanda (Pteridophyta and Phanerogamae). Kew Bull. **1940**: 81–134.
Standley, P. C. 1922. Cracca *in* Trees and shrubs of Mexico (Fagaceae-Fabaceae). Contr. U. S. Nat. Herb. **23**(2): 470–475.
——— and J. Steyermark. 1946. Tephrosia *in* Flora of Guatemala. Fieldiana: Botany **24**(5): 352–357.
Taubert, P. 1894. Tephrosia *in* Pflanzenfamilien **3**(3): 267–273.
Torrey, J. and A. Gray. 1838. Tephrosia *in* Flora of North America **1**: 295–297. New York.
U. S. Department of Agriculture. 1938. Soils of the United States *in* Soils and Men, Yearbook of agriculture 1938, pt. 5. 1019–1161 and map. Washington.
Vail, Anna M. 1895. A revision of the North American species of the genus Cracca. Bull. Torrey Club **22**: 25–36.
Vilkomerson, Hilda. 1943. Chromosomes of Astragalus. Bull. Torrey Club **70**: 430–435.
Walter, T. 1788. Galega *in* Flora Caroliniana. 187–188. London.
White, S. S. 1948. The vegetation and flora of the region of the Rio de Bavispe in northeastern Sonora, Mexico. Lloydia **11**: 229–302.

Additions and Corrections

Page 233, 234: Note that the synonymy given for *Tephrosia* Pers. includes only names which have been applied to species indigenous to or introduced into the Americas.

Page 267: To the synonymy of *Tephrosia virginiana* add *Tephrosia virginiana* var. *leucosericea* (Rydb.) F. J. Hermann, Jour. Wash. Acad. Sci. **38**: 237. 1948.

Page 315: To the synonymy of *Tephrosia chrysophylla* × *T. florida* add *Tephrosia ambigua* (M. A. Curtis) Chapm. var. *intermedia* (Small) F. J. Hermann, Jour. Wash. Acad. Sci. **38**: 237. 1948.

FURTHER DISTRIBUTION OF BUTOMUS UMBELLATUS IN THE GREAT LAKES REGION

L. O. Gaiser

With the finding of the European plant, *Butomus umbellatus* L., in the eastern end of Lake Erie during the past summer, it seemed worth while to review the further spread of this plant in and adjoining the Great Lakes system since 1941. Core[1] then published an account summarizing its first observations in Canada as recorded by Marie-Victorin[2], and in United States as given by Knowlton[3] and listing specimens of subsequent collections in eastern America to that date. As shown in his map, the plant had already established itself rather well along the St. Lawrence River up to Montreal. In the numerous botanical contributions from the University of Montreal, it has been commonly included as one of the plants of the riverflats. Going inland along that waterway, the plant was reported only from the western end of Lake Erie around Toledo and the Erie Islands (where, according to Core, it was seen first at Little Cedar Point, Ohio) as far north as the River Rouge in Wayne County, Michigan.

Since the writer first found *Butomus umbellatus* L. on the eastern side of Lake St. Clair at the end of Concession 7, Dover East Township, Kent County, in 1938, she has been interested in its further extension. Just when the plant arrived there is not exactly known. I have heard several accounts, as of arrival after the flood of 1929, and introduction by seed purchased from Toledo. Since there are no specimens to show that it was along the shoreline prior to 1930, when Farwell obtained it in Wayne County, Michigan, it seems unjustifiable to base conclusions on verbal evidence only. The note on the sheet of the Farwell specimen, No. 8742, of this date (G) states "In 1918 it covered acres of land in River Rouge that have since been filled in" and at least gives record of an early stand near by. The president[4]

[1] Core, "*Butomus umbellatus* in America."—Ohio Jour. Sci. **41**: 79–85, 1941.

[2] Marie-Victorin, Flore Laurentienne, 618 (footnote), 1935.

[3] Knowlton, "*Butomus umbellatus* at Lake Champlain". Rhodora **32**: 18, 19, 1930.

[4] Mr. C. H. Zavitz, of the Dept. of Lands and Forests, in Chatham has written: "Dr. Bell has his original notes and correspondence with Dr. John Dearness who made the determination. The original discovery was made July 21, 1934 (near Mitchell's Bay). Further plants were located on July 23, 1934, in a near-by drainage ditch". Other members of the original party had been W. Anderson of Chatham and J. H. Smith (deceased) of Rondeau.

of the very active Kent Nature Club, with two members of the original party, Dr. C. C. Bell and Mr. C. H. Hand of Chatham, has confirmed the report that it was first found by them near Mitchell's Bay, Dover East Township, Kent County, Ontario, on July 21, 1934. In the interval since, the plant has been reported from several stations near by, as the specimens listed indicate. By Hewitt[1] in 1940, it was described as having established itself well in the muskrat marshes of Mr. B. F. Bradley at the mouth of the Thames River. It is noteworthy that it has really proved of usefulness to the muskrats in supplying material for their houses and it is undoubtedly due to their activities that this handsome plant has become so generally distributed in portions of that marsh area. Thus in addition to the natural advantages for the introduction of this plant from Europe to the great St. Lawrence waterway as described by Dr. Fernald[2], it seems actually to have active agents to aid in its further establishment.

Other specimens prove its successful establishment after introduction, as in New York State. Dr. W. C. Muenscher[3] reports: "This species was introduced at the southern end of Cayuga Lake in 1930 by introducing a few rootstocks from Lake Champlain. From this locality *Butomus* has become well established and has spread to several localities in the marshes about the inlet to Cayuga Lake and also along the east shore of the Lake northward to a point about 3 miles from the original planting. It was also introduced in Isoetes Pond, in Cortland County, by introducing some seeds in 1940. By 1942 several plants producing flowers and seeds were present in the Pond. It has persisted and spread to a small extent since that time."

Likewise the more numerous specimens from along the Ottawa River and Rideau Canal region in Ontario, indicate its satisfactory establishment there. One introduction which seems curiously not to have succeeded is that of Demsey[4] who brought it from La Prairie County, Quebec, and planted it in two places in the Dundas Marsh, Hamilton, where no one so far has reported seeing it.

[1] Hewitt, "A Study of the Ecology of an Artificial Fresh-water Marsh with Special Reference to Ducks and Muskrats". M.Sc. Thesis, Cornell University, 1941 (unpublished).

[2] Fernald, "The Problem of Conserving Rare Native Plants". Smithsonian Report: 375–391, 1939.

[3] By private communication.

[4] Demsey, Canadian Field Nat. **48**: 145, 1935.

Almost coincidental with the publication of Core's[1] "Flora of the Erie Islands", noting the rapid spread of *Butomus* throughout the island group south of the international border, came the first recorded collection of it on the Canadian side at the eastern end of Lake Erie in Welland County, Ontario. Mr. Bert Miller[2] found about ten plants on Aug. 17, 1948, in the small creek that flows into the lake about 6 miles west of Port Colborne. In the Museum of Natural History, Buffalo, there are no specimens and to Mr. Zenkert's[3] knowledge, there have been no reports of its having been observed previously at the eastern end of Lake Erie on the Canadian side. It has now been learned that it had been discovered on July 24 by Dr. Witz at the mouth of Elk Creek, Erie Co., Pennsylvania, and that it has grown there in abundance for the past few years, spreading to the bay side at the eastern tip of the Presque Isle peninsula by 1946.

By subsequent inquiry it was learned from A. W. Stokes[4], of the Pelee Island Pheasant Demonstration Project, that "a stand of perhaps 30 plants growing within a circle of a radius of 5 yards" was found there this past autumn and one specimen was sent to the Franz Theodore Stone Laboratory at Put-in-Bay. He writes: "It grows about 5 yards back of the high water mark in a low-lying field that remains wet most of the year, although by September the ground was quite firm".

As had been noted by Core, l. c., a sterile deep-water form with long leaves, *B. umbellatus* forma *vallisneriifolius* (Sagorski) Glück, had also been collected in various places. That this sterile form has survived is seen in a further specimen of it from New Haven, Conn., in Turtle Brook and marginal marshy area near airport, *J. J. Neale*, Sept. 5, 1943 (G, N). Also its survival has been noted at Put-in-Bay by Professor J. Verduin[3] as follows: "The early location for these islands (Alligator Bar) has been under about two feet of water for the past five years and there is a stand of submerged *Butomus* in that area which is sterile and has the characteristics described for the forma *vallisneriifolius*".

Though *Butomus umbellatus* L. is not known to have been seen in Lake Ontario as yet, it seems probable that we may look for-

[1] Core, The Flora of the Erie Islands, Franz Theodore Stone Laboratory, Ohio State University. Contribution 9, 1948.

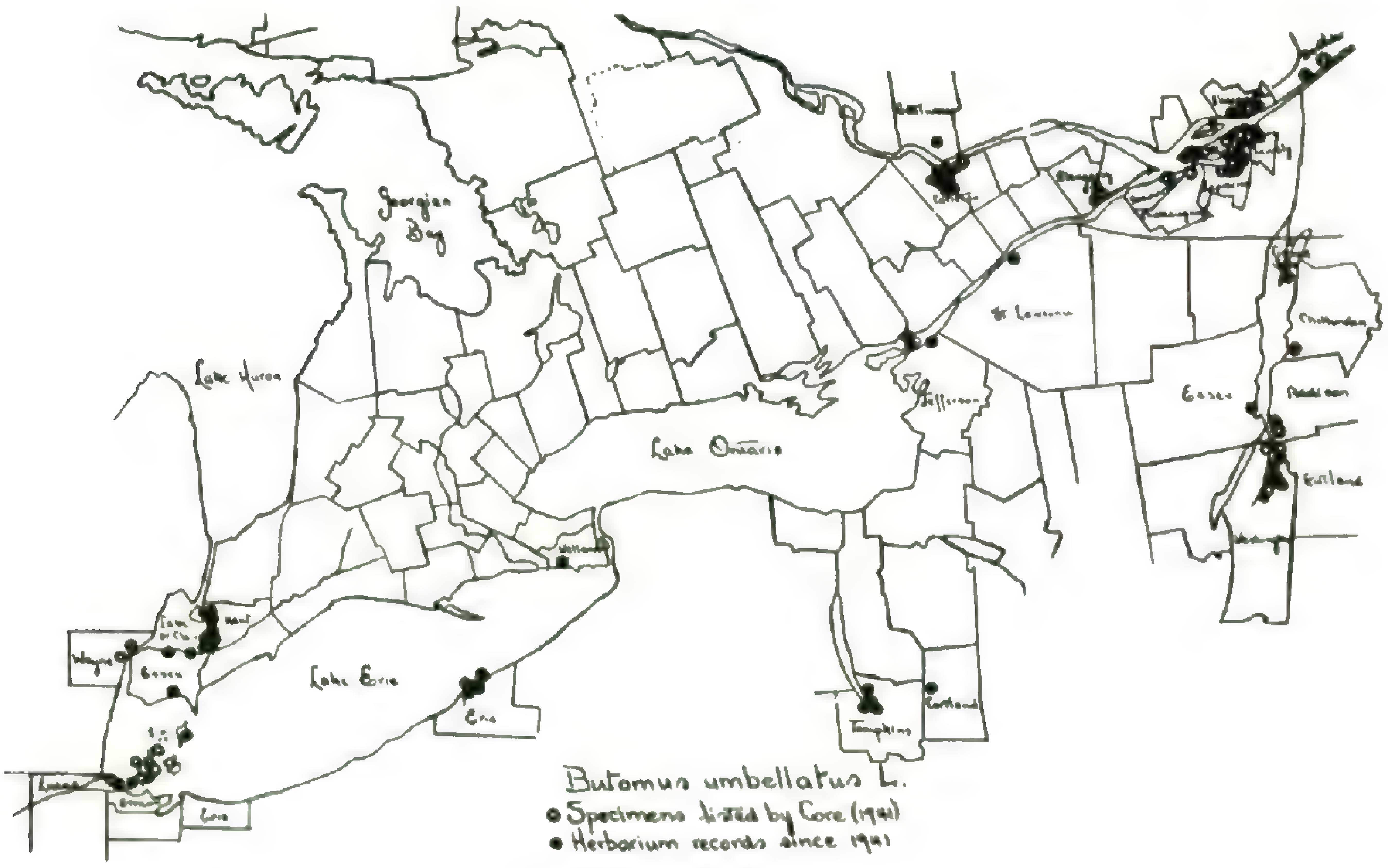
[2] Aided by a grant from the Research Council of Ontario.

[3] By private communication. Dec. 30, 1948.

[4] By private communication. Dec. 11, 1948.

ward to its general establishment about our Great Lakes basin at least to the beginning of Lake Huron.

To the curators of various herbaria[1] who have contributed information or specimens we express appreciation. The additional reports since 1941 have been compiled and the additional range shown by the map.



Quebec. berthier co.: Lanoraie, shores of the St. Lawrence River, Aug. 5, 1923, *H. K. Svenson, N. C. Fassett* 1054, (G). l'assomption co.: St. Sulpice, muddy shore of the St. Lawrence River, Aug. 3, 1923, *C. H. Knowlton* (G); St. Lawrence River, St. Sulpice, Aug. 29, 1935, *B. Boivin* (Ot); river flats along the n. shore of the St. Lawrence River, between Repentigny and St. Sulpice, Aug. 23, 1947, *J. H. Soper, D. A. Frazer* (T). chambly co.: Longueuil, July, 1906, *Frère Marie-Victorin* (Ot); Sept. 1915, *Victorin* 1046 (G); Sept. 12, 1931, (PeU); Longueuil, abondant sur les grèves du St. Laurent, Sept. 25, 1925, *Victorin* 20414, (G); Longueuil, entre l'île Verte et le rivage, *Victorin* 45, 696, (T). laval co.: Academie St. Joseph, Montreal, Aug. 22, 1921, *Frère Edmond* (Ot); near river, Montreal, Aug., 1926, *Wm. Rhoades* (C). laprairie co.: Laprairie,

[1] In citing specimens from various herbaria, the following abbreviations will be used: C—Cornell University; Ch—Dominion Entomological Laboratory, Chatham, Ont; F.T.S.—Franz Theodore Stone Laboratory of the Ohio State University, Put-in-Bay; G—Gray Herbarium; Gu—Ontario Agricultural College, Guelph; M—McMaster University, Hamilton; N—New England Botanical Club at the Gray Herbarium; O—National Museum, Ottawa; Ot—Dominion Experimental Farm, Ottawa; OS—Ohio State University, Columbus; P—Carnegie Museum, Pittsburgh, Pa; A. S.—A. G. Shields, Penn. State College Behrend Centre; Pe U—University of Pennsylvania; T—University of Toronto; W—University of Western Ontario, London, Ontario.

shores of the St. Lawrence River, Aug. 4, 1923, *H. K. Svenson & N. C. Fassett* 1053, (G, G without number); Laprairie, shallow water, Sept. 17, 1941, *A. S. Pease* 29364, (G, PeU without number); river marshes, St. Lawrence River, s. of St. Lambert, near Montreal, Aug. 22, 1924, *K. M.* and *M. C. Wiegand* (C); La Tortue, Sept. 19, 1926, *Victorin* 24709, (G); Quai de la Tortue, July 19, 1940, *C. Marcoux* (Ot). GATINEAU CO.: Cascades Point, Aug. 28, 1930, *L. J. Milne* 85.1, (T). ONTARIO. GLENGARRY CO.: South Lancaster, 1 mi. s. of Lancaster on No. 2 Hwy., very near Lake Ontario, July 31, 1941, *H. Groh* 1550, (Ot); Raisin River, near the boundary of Quebec on the route Montreal-Toronto, *Victorin* 46, 741, (T). CARLETON CO.: Rideau Canal, Ottawa, July 23, 1912, *J. W. Eastham* (Ot); swampy lagoon, West Bank St. Canal, Ottawa, July 1, 1912, *W. H. Harrington* (O); Ottawa, July 6, 1915, *F. Fyles* (Ot); Rideau Canal, Ottawa, June 6, 1933, *E. G. Anderson, W. H. Minshall* (Ot); Brown's Inlet (off Rideau Canal), Ottawa, Aug. 12, 1941, *E. G. Anderson* 535 (Ot); along Rideau Canal, s. end of Arboretum, Central Experimental Farm, Ottawa, July 9, 1942, *M. N. Zinck* 1209, (Ot); Hurdman's Bridge, along edge of Rideau River, Ottawa, July 20, 1943, *W. G. Dore* (Ot); swamp s. w. of Ottawa, *O. S. Brenat* (Gu); dead fruit collected in Rideau Canal system, Nov. 15, 1948, *O. Hewitt* (M). WELLAND CO.: in small creek, 1 mi. w. of Burnaby, 6 mis. w. of Port Colborne, Aug. 17, 1948, *B. Miller* (M). KENT CO.: Mitchell's Bay, Aug. 13, 1934, *A. A. Wood, J. Dearness* (W), *A. A. Wood* (Ch, T), Sept. 12, 1934, *G. M. Stirrett* (Ch), Aug. 13, 1943, *H. F. Hudson* (Ch); shoreline of Lake St. Clair, St. Luke's Bay, end of concession 7, Dover East Tp., Aug. 26, 1938, *L. O. Gaiser* 75, (Ot, M); Bradley's Muskrat Farm, mouth of Thames River, June 22, 1940, *Hewitt* (M); 1 mi. n. e. of mouth of Thames River, at Lake St. Clair, Aug. 10, 1940, *J. H. Soper, Hewitt* 2334 (Ot, M, G); Bradley's Marsh, Dover West Tp., Sept. 2, 1943, *W. H. Minshall* 3415, (Ot); along e. side of shore road, Bradley's Marsh, mouth of Thames River, Dover West Tp., June 6, 1948, *L. O. Gaiser, R. Neal* (M). ESSEX CO.: Stoney Point, Sept. 12, 1934, *G. M. Stirrett* (Ch); drainage ditch of Lake St. Clair, Belle River, June 24, 1944, *W. G. Dore* 44–14, (Ot); drainage ditch into Lake Erie, Kingsville, June 26, 1944, *Dore* 44–20, (Ot); North Bay Marsh, Pelee Island, Sept. 25, 1948, *A. W. Stokes* (F. T. S). VERMONT. GRAND ISLE CO.: Grand Isle, swale by Lake Champlain, abundant, July 14, 1941, *C. H. Knowlton* (N). CHITTENDEN CO.: Charlotte, clayey strand of Lake Champlain, Aug. 27, 1942, *C. A. Weatherby* (N). ADDISON CO.: near Orwell, wet muddy shore of Lake Champlain, Sept. 1931, *C. Schweinfurth* (N). RUTLAND CO.: West Haven, Lake Champlain, Aug. 20, 1929, *W. C. Muenscher, W. E. Manning* and *B. Maguire* 207, (G); West Haven, shore of bay, Lake Champlain, Aug. 15, 1930, *H. L. Potter* (N). NEW YORK. ESSEX CO.: Montcalm's Landing, near Ticonderoga, July 18, 1939, *H. D. House* 26763 (G), (C, PeU without number). WASHINGTON CO.: edge of lake, Whitehall, Aug. 4, 1930, *F. Dobbin* 660, (G); 2 mis. s. of Whitehall, Lake Champlain, Aug. 20, 1934, *J. M. Fogg* (PeU); South Bay, Lake Champlain, Aug. 6, 1938, *W. C. Muenscher* and *O. L. Justice* 812, (G, T, PeU). ST. LAWRENCE CO.: in slough along St. Lawrence River, e. of Waddington, Aug. 22, 1947, *W. C. Muenscher, Babette I. Brown* 16325, (C). JEFFERSON CO: growing on low muddy shore, Flynn's Bay, s. w. corner of Grindstone Island, St. Lawrence River, July 25, 1946, *A. Hotchkiss* (C); sand bar, one foot deep, McRay's Bay, n. w. region of

Grindstone Island, St Lawrence River, July 30, 1946, *Hotchkiss* (C); growing on a shallow muddy bar on the e. shore of Goose Bay, St. Lawrence River, Aug. 19, 1946, *Hotchkiss* (C). CORTLAND CO.: from seed introduced in Oct. 1940, Isoetes Pond, near McLean Bogs, Aug. 6, 1942, *W. C. Muenscher, D. Isely, Babette I. Brown* (C). TOMPKINS CO.: w. end of Stewart Park, shore of Cayuga Lake, Ithaca, June 25, 1936, *Muenscher* (C); on island in Cayuga Inlet, Floral Ave., Ithaca, Aug. 29, 1941, *Muenscher, W. T. Winne* (C); apparently from seed scattered by Muenscher, 1941, roadside ditch, Rt. 13, 1 mi. s. w. of Ithaca, July 25, 1942, *Isely* (C); e. shore of Cayuga Lake, ½ mi. n. of Esty, Oct. 16, 1943, *Muenscher, Babette I. Brown* (C). PENNSYLVANIA. ERIE CO.: mouth of Elk Creek, several mis. w. of Erie, Pa., July 22, 1941, *Miss M. C. Wright* (P); July 11, 1946, *A. J. Shields* (A. S); near tip of Presque Isle Peninsula, Thompson Bay, 1946, *W. R. Witz* (P); Elk Creek, July 17, 1947, *R. Kelley* (C). OHIO. OTTAWA CO.: Hatchery Bay, South Bass Island, Aug. 20, 1936, *L. H. Tiffany* (O. S). LUCAS CO.: Little Cedar Point Marsh, Sept. 16, 1936, *J. J. Lynch* (O. S).

MACMASTER UNIVERSITY, Hamilton, Ontario.

POTENTILLA PROCUMBENS IN THE UNITED STATES.—The first arrival of a plant into the United States is always botanical news. It poses again the interesting problem of range-extensions and methods of dispersal, as well as the probability of adaptation to a new environment.

In the latter part of November of 1948 the writer collected *Potentilla procumbens* Sibth., as it has been known, near Lake Shehawken, Wayne County, Pennsylvania. It was so identified tentatively, and material was recently sent to the Gray Herbarium where Dr. Fernald confirmed the identification, but reported that in the new edition of Gray, now in preparation, the name will be changed to *P. anglica* Laisch. The Pennsylvania material, he reports, "is more dichotomously branching than in most plants".

He also reports that it is "indigenous on peaty or bushy slopes of southern Labrador, southeastern Newfoundland, and Cape Breton Island,—and occurs as an adventive in southeastern Nova Scotia".

In the Pennsylvania locality it is growing on a somewhat wet rocky slope over an area of about 30–40 feet in extent. It is abundant, growing with the usual pasture grasses, with *Juncus effusus* and the following adventives: *Ranunculus acris, Mentha spicata, M. piperita, Cirsium lanceolatum, C. arvense,* and *Hieracium aurantiacum.*

The soil is a clayey loam, the rocks are Upper Devonian, and the elevation is 1850 above sea level.

The plants found here agree with the descriptions, except as Dr. Fernald noted, and in the size of the flowers which are somewhat larger, being about 10–13 mm. broad.

The abundant growth of the plants does not point to recent introduction. The immediate area has not been seeded since the timber was cut about one hundred years ago, and has been continuously used as a pasture. There is a possibility of its introduction here with the importation of Canadian cattle, a practice common here for the last twenty-five years. Another possible reason for this Canadian stray here in Pennsylvania is found in the migratory flight of birds

The recent, September 24, 1949, discovery of another locality about a quarter mile south of the original place seems to indicate that *Potentilla anglica* may be more common than these original collections indicate. As it blossoms late in the fall, it is conspicuous at some distance and will need to be distinguished only from the common five petalled oxalis also a late flowering plant of pastures.—W. L. Dix, Morrisville, Pennsylvania.

SETARIA FABERII IN ILLINOIS

Robert A. Evers

Setaria faberii, a weedy species of grass described by Herrmann (3) and introduced into the United States from China (1) perhaps in Millet, has been reported from a number of states. Allard (1) reported it from Virginia and Fernald (2) cited it from Pennsylvania, southwestern New Jersey, Delaware, Virginia and Massachusetts. Wood (5) reported it from North Carolina and Pohl (4) added Tennessee, Kentucky, Missouri and Nebraska to the list of states in which it occurs. None of these writers credited the grass to Illinois.

Both Fernald and Pohl provide keys to separate *Setaria faberii* from the other *Setaria* species found in the eastern United States. By use of these keys, I identified 11 specimens as *Setaria faberii* among the collections which I made in Illinois in 1947 and 1948. These specimens, determined as *Setaria faberii*, I compared with *V. H. Chase* 9106, previously determined by Mrs. Agnes Chase. With Fernald's statement in mind, "*Setaria Faberii* will doubtless

be found in other herbaria, confused with other species", I critically examined all sheets of *Setaria* in the herbarium of the Illinois State Natural History Survey and, as a result of this procedure, found two sheets of this Asiatic grass. With the permission of Prof. G. N. Jones, I also examined the material in the herbarium of the Department of Botany of the University of Illinois.

The following list of Illinois specimens of *Setaria faberii* is from collections located in the herbarium of the Illinois State Natural History Survey or in that of the University of Illinois (UI).

Adams Co.: Roadside north of Quincy, Sept. 25, 1948, *R. A. Evers* 15161. Champaign Co.: Weed in a soybean field, University farm, Urbana, Sept. 7, 1948, *F. W. Slife* (UI). Cook Co.: Cornfield, Palatine, Sept. 22, 1947 (determined by *Agnes Chase*), *V. H. Chase* 9106. Fayette Co.: In a field north of Ramsey, Sept. 12, 1948, *R. A. Evers* 14377. Ford Co.: Along the railroad south of Paxton, Sept. 14, 1948, *R. A. Evers* 14402. Jackson Co.: Summit of Fountain Bluff south of Gorham, Oct. 2, 1948, *R. A. Evers* 15403. Knox Co.: Roadside ditch southeast of Knoxville, Sept. 19, 1948, *R. A. Evers* 14876. McLean Co.: In a field east of Heyworth, Sept. 19, 1948, *R. A. Evers* 14938. Monroe Co.: Along the railroad at Poe, Sept. 17, 1947, *R. A. Evers* 8016; roadside south of Hecker, Sept. 11, 1948, *R. A. Evers* 14116. Montgomery Co.: Roadside north of Litchfield, Sept. 10, 1948, *R. A. Evers* 14052. Piatt Co.: In a field east of DeLand, Sept. 21, 1948, *R. A. Evers* 14958. Saline Co.: Railroad right-of-way, 2 miles north of Stonefort, Aug. 17, 1943 (as *S. lutescens* (Weigel) F. T. Hubb.), *G. H. Boewe;* roadside southwest of Texas City, Sept. 25, 1947, *R. A. Evers* 8604. Union Co.: Prairies, State Forest, Aug. 3, 1941 (as *S. viridis* (L.) Beauv.), *G. D. Fuller* 777.

Literature Cited

1. Allard, H. A. 1941. Some plants found in northern Virginia and West Virginia. Virginia Journ. Sci. **2**: 119.
2. Fernald, M. L. 1944. *Setaria Faberii* in eastern America. Rhodora **46**: 57–58.
3. Herrmann, W. 1910. Über das phylogenetische Alter des mechanischen Gewebesystems bei *Setaria.* Beiträge Biol. Pflanzen. **10**: 51.
4. Pohl, Richard W. 1947. A taxonomic study of the grasses of Pennsylvania. Amer. Mid. Nat. **38**: 593.
5. Wood, Carroll E. 1946. *Setaria Faberii* in North Carolina. Rhodora **48**: 391–392.

Illinois State Natural History Survey, Urbana, Illinois.

A Simple Plastic Collecting Bag.—The metal vasculum has long been the botanist's public label and a very useful piece of equipment. At times it is a bit cumbersome, if one is not too professionally disposed. Often I have used the newspaper method, which is convenient if little or no collecting materializes, but the paper does dry out and becomes frayed with rolling and unrolling.

The past summer I needed to take the train to the point of field work and wished to dispense with unessential baggage. Considering the newspaper method for daily collecting, I reflected that a sheet of plastic would be both simpler and more effective. When I mentioned the possibility of a plastic bag, my wife suggested a pillow case. This (with zipper) was added to the equipment and proved sufficiently satisfactory to merit a note on its use.

The plastic bag has some disadvantages, including exposure to sunshine. A little paper for lining or wrapping individual lots, might be helpful. It is very convenient if no collecting is done since it can be carried in the pocket. It is nice where plants are transferred to the press in a short time and is satisfactory for as long a period as the vasculum.—O. A. Stevens, North Dakota Agricultural College, Fargo, N. D.

An Unusual Station for Eastern White Pine.—In June 1949 the writer discovered a single white pine (*Pinus strobus* L.) growing on the west side of the Bondcliff Trail about 1/8 mile from the summit of Mt. Bond (4714 ft.) in the town of Lincoln, N. H. The point where the tree stands is between 4500′ and 4600′ above sea level as estimated from the U. S. G. S. Map. This is on a southwest slope in dense scrub balsam fir, and occasional black spruce, which reaches to shoulder height. The pine is about 2 inches in diameter and, while stunted and crowded by the surrounding scrub, appears to be healthy and exhibits no blister rust infection. Skunk currant bushes, abundant on the other side of the mountain were not observed in the immediate vicinity.

The occurrence of white pine at this place appears to be noteworthy both because of the altitude, and distance from other pines that could have provided a source of seed as well as the

prevalence of species of Ribes, alternate host for white pine blister rust, that makes survival of white pines in the higher mountains unlikely. Ribes bushes infected with blister rust have been observed by the writer near the summit of Mt. Washington as well as generally in the higher peaks.—Henry I. Baldwin, New Hampshire Forestry & Recreation Commission, Concord, N. H.

Volume 51, no. 611, consisting of pages 305–368 and plates 1153–1155, was issued 4 November, 1949.

ERRATA

Page 12, line 31; for *Loeslii* read *Loeselii.*
Page 19, line 34; for *montana* read *montanus.*
Page 21, line 25; for **typica** read **typicum**.
Plate 1140, caption, line 2; for *Tidestromi* read *Tidestromii.*
Page 92, line 20; *omit* and *C. Standley-*.
Page 92, line 21; omit whole line.
Page 96, lines 15 and 20; for CAERULESCENS read COERULESCENS.
No. 607, cover, line 6; for **ovata** read **ovalis**.
Page 198, line 8; *for* 1853 *read* 1854.
Page 206, line 5; *for* Atkinson *read* Atchison.
Page 208, last line; *for* utilizeable *read* utilizable.
Page 240, line 12; *for* 5.5 *read* 5.
Page 240, line 15; *for* lobes *read* lobe.
Page 245, line 3; for *Conduz* read *Tonduz.*
Page 245, line 7; *for* Boqueli *read* Boquete.
Page 251, line 26; *for* 5.5 *read* 5.
Page 310, line 25; *for* Michaux' *read* Michaux's.
Page 311, line 2; *for* Michaux' *read* Michaux's.
Page 363, Map 22; *for* Abbottae *read* Abbottiae.

INDEX TO VOLUME 51

New scientific names are printed in full-face type

Abbreviated Flora of Maine (Review), An, 5
Abies balsamea, 8; concolor, 6
Abutilon Theophrasti, 8
Acalypha rhomboidea, 111; virginica, 111
Acer dasycarpum, 137; rubrum, 105, f. **pallidiflorum, 103,** var. pallidiflorum, 103; saccharum, 155; saccharinum, 137
Actaea rubra, 148
Additions to the Harris "Flora of Windham, New Hampshire", 107
Again, Epipactis Helleborine, 162
Agropyron pungens, 8; Smithii, 21, var. molle, 21, var. **typica, 21;** subsecundum, 168
Agrostis, 192; and Convolvulus, Errors of Citation in, 192; alba, f. aristata, 192, f. **aristigera, 192;** Elliottiana, 127; stolonifera, f. aristigera, 192; verticillata, 126
Aletris aurea, 132
Algae, 4
Allionia incarnata, 20, 23
Allium Schoenoprasum, 110, var. sibiricum, 110
Alnus serrulata, var. vulgaris, 116
Alopecurus carolinianus, 127
American Barbistyled Species of Tephrosia (Leguminosae), The, 193–231, 233–302, 305–364, 369–384, pls. 1152–1155
Amesia latifolia, 163
Amphicarpon Purshii, 125
Anaphalis margaritacea, 144
Andropogon Gerardi, 20; saccharoides, 19; scoparius, 20
Anemone cylindrica, 110; multifida, 8; parviflora, 8; Pulsatilla, 31
Anemonella thalictroides, f. Favilliana, 148
Angelica atropurpurea, 111
Antedated by R. laxicaulis (T. & G.) Darby, Ranunculus texensis Engelm., 164
Antennaria, 97; neglecta, 112; neodioica, 112
Anthoxanthum odoratum, 125
Anychia capillacea, 110
Aphanostephus pilosus, 28; ramosissimus, 27, 28; skirrhobasis, 24, 25
Aphyllon uniflorum, 111
Apodynomene, 233, 374; grandiflora, 233, 372; Meyeri, 372
Aralia spinosa, 155
Arctoa Starkei, 122
Arctostaphylos, 366
Arctous, 366
Aristida divaricata, 20; glauca, 20; lanosa, 127; oligantha, 127; spiciformis, 126; stricta, 137
Armeria, 367
Arrhenatherum elatius, 8
Artemisia filifolia, 24, 25; ludoviciana, var. Brittonii, 8
Artz, Lena, Notes on four Virginia Plants, 12
Asclepias macrotis, 59; variegata, 21
Ash, 12; black, 12
Asimina triloba, 155
Aspens, 367
Asprella Hystrix, 109
Aster, 83, 99; subg. Euaster, 121; acuminatus, 101, 102, f. **subverticillatus, 101,** var. **magdalenensis, 101,** 102; aestivus, 92; Amellus, 121; anomalus, f. **albidus, 119;** azureus, 94, 95, f. **laevicaulis, 94,** var. **poaceus, 95;** azureus scabrior, 94; Blakei, 101; coerulescens, 91, 92, the same as A. praealtus, 91, var. **angustior, 96,** var. **subasper, 96;** ciliolatus, 97, f. **comatus, 95;** cordifolius, 112; crenifolius, 96–99, pl. 1147; diffusus, 90; douglasii, 97; ericoides, 112, f. **exiguus, 96,** f. **prostratus, 96;** exiguus, 96; exilis, 119; foliaceus, 91, 96–99, pls. 1148–1150, or A. crenifolius in the Northeast—which?, 96, pls. 1147–1150, var. arcuans, 96, var. crenifolius, 97, var. subgeminatus, 96, var. subpetiolatus, 96, var. typicus, 98, 99; gaspensis, 99; hesperius, 92; johannensis, 99, var. **villicaulis, 99;** lateriflorus, 90; ledifolius, 100, β. uniflorus, 100; linariifolius, 100, var. Victorinii, 10; Lindleyanus, var. comatus, 95; longifolius, 92, 99, var. villicaulis, 99; lucidulus, 95; miser, 90; missouriensis, 89–91, var. thyrsoideus, 90; missuri-

ensis, 89; multiflorus, 112, var. exiguus, 96, β. prostratus, 96; nemoralis, 100, 101, f. **albiflorus, 99**; Novi-Belgii, 92; ontarionis, 90, the same as A. pantotrichus (A. missouriensis), 89; paniculatus, 91; pantotrichus (A. missouriensis), Aster ontarionis the same as, 89; pantotrichus, 89, 90; pilosus, f. pulchellus, 119; poaceus, 95; praealtus, 91, 92, Aster coerulescens the same as, 91, var. angustior, 96, var. subasper, 96; pubentior, 102, 103; puniceus, 95, 99, 112, 231, f. albiflorus, 95, 231, 232, var. albiflorus, 95, 231, 232, puniceus, f. **candidus, 95**, 232, f. **demissus, 95**, var. demissus, 95, var. firmus, 95, 231, 232, The White Form, 231, f. **etiamalbus, 232**, f. **lucidulus, 95**, var. laevicaulis, 95, var. lucidulus, 95, 117, f. albiflorus, 95, 231, 232; salicifolius, 92, var. subasper, 96; subasper, 96; subgeminatus, 97; tardiflorus, f. **vestitus, 95**, var. vestitus, 95; Tradescanti, 90; umbellatus, 102, f. **intercedens, 102**, var. pubens, 102; uniflorus, 100

Astereae, Some Northern, 93–103, pls. 1146–1150

Astragalus, 204

Athyrium, 7; thelypterioides, 109

Atriplex canescens, 20; hastata, 11

Aureolaria, subg. Panctenis, 84; flava, var. macrantha, 84; grandiflora, var. pulchra, 84; pedicularia, var. austromontana, 85, var. intercedens, 85

Baccharis Wrightii, 20, 28

Balboa, 234; diversifolia, 234, 381

Baldwin, Henry I., An Unusual Station for Eastern White Pine, 393

Baldwin, J. T., Jr., Chromosomes of Trillium pusillum Michx., var. virginianum Fernald, 368; Helenium Curtisii in Virginia, 303; Mistletoe on Persimmon, 105; Polyploidy in Passiflora lutea, 29

Balsam-Poplars, 367

Barbarea vulgaris, 111, var. arcuata, 111

Barbasco, 246

Barbistyled Species of Tephrosia (Leguminosae), The American, 193–231, 233–302, 305–364, 369–384, pls. 1152–1155

Barbieria, 222

Bartramia, 123

Basicladia, 232, in Maine, 232; chelonum, 232

Benthamantha, 198, 199; mollis, var. macrantha, 382

Benzoin, 162; aestivale, 155, var. pubescens, 155; melissaefolium, 154, 155

Berteroa incana, 110

Bibliography, An Indispensable, (Review of Rehder's Bibliography of Cultivated Trees and Shrubs), 365; of Charles Alfred Weatherby, 179

Bidens cernua, 112

Birch, 367

Black Ash, 12

Blackberries, old and new, 43–51, pls. 1130–1132

Blindia acuta, 123

Boehmeria cylindrica, 110

Bog Aster, 100

Bog-aster, 100

Bolusia, 222

Bonamia aquatica, 35, 37, 38; Pickeringii, 42

Botanizing in Oklahoma, Some Results of a Summer's, 18

Botrychium 7; dissectum var. typicum, 147; Lunaria, 8; simplex, f. **laxifolium, 103**, var. laxifolium, 103

Bouteloua curtipendula, 19; eriopoda, 20; gracilis, 8, 19

Brachiaria extensa, 115

Bradley, Leonard J., Cyperus brevifolius in Fairfield County, Connecticut, 119

Breweria, 38; Some Identities in, 35–43, pls. 1121–1129; subg. Stylisma, 36; angustifolia, 36, 38, 41, pl. 1124; aquatica, 35–37, 40, pl. 1121; elliptica, 37, 38; humistrata, 36, 38, pl. 1122; **Michauxii, 37**, 38, pl. 1123; patens, 37; Pickeringii, 26, 35, 36, 38, 40–42, pl. 1125, var. **angustifolia**, 41, **42**, pl. 1125, var. **caesariensis**, 41, **42, pls. 1126, 1127**, var. **Cuthbertii**, 41, **42**, 43, **pl. 1128**, var. **Pattersoni**, 41, **42, pl. 1129**; trichosanthes, 37

Brissonia stipularis, 382

Brittonamra, 198

Briza media, 109

Bromus, 6; anomalus, 21, var. lanatipes, 20, 21; ciliatus, 107;

Dudleyi, 106, 107; Kalmii, 6; nottowayanus, 127
Brunnichia cirrhosa, 21
Buchloë dactyloides, 19, 25
Bumelia lycioides, 139
Bush, Spice, 153, 156
Butomus, 386, 387; umbellatus, 385, in the Great Lakes Region, Further Distribution of, 385, f. vallisneriifolius, 387

Calamagrostis canadensis, 8; cinnoides, 57
Caldwell, John J., Zoochlorella conductrix occurring in New Brunswick Symbiotically with Ophrydium, 4
Callirhoe lineariloba, 25
Callitriche heterophylla, 111
Calystegia, 193; Catesbeiana, 70–72; hederacea, 74; japonica, 73; pubescens, 73, 74; sepium, 71, var. japonica, 73, var. pubescens, 70–72; spithamaea, 71; subvolubilis, 73
Camassia scilloides, f. **variegata, 116**
Camelina sativa, 111
Campanula, 303; **Rentonae,** sp. nov., **302**
Cannaceae, 208
Cardamine flexuosa, 111; pensylvanica, 111
Carduus, 33
Carex anceps, 110; angustior, 110; brevior, 110; cephalantha, 110; cephalophora, 110; comosa, 110; debilis, var. Rudgei, 110; decomposita, 117; Deweyana, 110; echinata, var. cephalantha, 110, var. microstachys, 110; exilis, 110; filiformis, var. latifolia, 110; Grayii, 167; intumescens, 167; lanuginosa, 110; Merritt-Fernaldii, 10; monile, 110; Muhlenbergii, 10; pallescens, 110, var. neogaea, 110; Pseudo-Cyperus, var. americana, 110; rariflora, 8; siccata, 110; straminea, 110, var. brevior, 110; Swanii, 110; tenera, 110; trichocarpa, 120; umbellata, 110; vesicaria, var. monile, 110; virescens, 110
Carlina, 33, 34; vulgaris, 33, 34, pl. 1120, in the Cayuga Quadrangle, 42–43° N., 76–77° W., 33, pl. 1120
Carya, 46, 150; borealis, 89; glabra, 86, 88, 150–152, glabrata in Durham, New Hampshire and Vicinity, Carya ovalis and, 150; microcarpa, 89; ovalis, 85, 86, 88, 89, 150–152, and Carya glabrata in Durham, New Hampshire and Vicinity, 150, var. borealis, 89, var. obcordata, 152, var. obovalis, 150, 152, var. odorata, 87, 88, 152; ovata, 86, 88, 89, var. **borealis,** 89, var. Nuttallii, 89
Cassia bicapsularis, 207; multijuga, 207; Tora, 21
Cat-gut, 209
Catch-fly grass, 126
Cayuga Quadrangle, Carlina vulgaris in the, 33, pl. 1120
Cenchrus incertus, 127; longispinus, 8; myosuroides, 126; pauciflorus, 8
Cercocarpus montanus, 19, 23
Cevallia sinuata, 25
Chadsia, 222
Chamaesaracha, 83; **grandiflora, 82**
Change of Status for two Species of Chrysopsis, 113
Chara, 14; intermedia, 14, var. americana, 14
Characeae, 13, 14, I. Emendation of Nitella Morongii, Monographic Studies on the, 13, pl. 1119
Chenopodium, 7; album, 8; gigantospermum, 92, var. Standleyanum, 92; graveolens, 7; hybridum, 92, var. gigantospermum, 92, var. Standleyanum, 92, var. **Standleyanum, 92;** Standleyanum, 92
Chicago Area in Illinois, Plants New to Illinois or to the, 147
Chimaphila maculata, 108, 111
China-Aster, 6
Chromosomes of Trillium pusillum Michx., var. virginianum Fernald, 368
Chrysopsis, 113, 114; Change of Status for two Species of, 113; group Marianae, 115; group Pilosae, 115; adenolepis, 143; arenicola, 113–115; Correllii, 144; decumbens, 113–115; gossypina, 113–115, f. **decumbens, 113;** pinifolia, 144
Chrysosplenium, 191; alternifolium, 191, 192, var. sibiricum, 191; iowense, 191, 192, Note on, 191; sibiricum, 192; tetrandrum, 191
Chute, R. M., Basicladia in Maine, 232
Cicer astragaloides, etc., 267
Cinna arundinacea, 109, 127

Cirsium, 33, 34; arvense, 390; lanceolatum, 390; muticum, 112
Clausen, Robert T., Carlina vulgaris in the Cayuga Quadrangle, 42–43° N., 76–77° W., 33, pl. 1120
Clintonia borealis, 110
Clitoria foliis pinnatis, 292; ?sericea, 351
Cnicus muticus, 112
Colinil, 233; cinereum, 378; rosea, 372
Collecting Bag, A Simple Plastic, 393
Collomia, 7; linearis, 7
Comandra umbellata, 10
Compositae, 98, 101, 223
Connecticut, Cyperus brevifolius in Fairfield County, 119
Contributions from the Gray Herbarium of Harvard University—No. CLXIX, 35–57, 61–85, 93–104, pls. 1121–1150; No. CLXX, 193–231, 233–302, 305–364, 369–384, pls. 1152–1155
Convolvulaceae, 208
Convolvulus, 39; Errors of Citation in Agrostis and, 192; aquaticus, 35–40, pl. 1121; Catesbeianus, 70; erianthus, 38; hederaceus, 74; humistratus, 37, 40; japonicus, 73; panduratus, 75; patens, 36, 37, 39, 40, pl. 1121; pellitus, 73, 74, f. **anestius, 73,** 75; repens, 71; Pickeringii, 36, 38–40, 42; pubescens, 73; sepium, 70–74, f. coloratus, 72, f. **malachophyllus, 72,** var. americanus, 72, var. communis, 72, var. dumetorum, 73, var. fraterniflorus, 72, var. pubescens, 70, var. repens, 71, 193; spithamaeus, 10, 71, var. Catesbeianus, 70, 72, var. **pubescens, 70**–72; subvolubilis, 73; tenellus, 40; trichosanthes, 36, 37, 40, pl. 1123, var. patens, 39; Wallichianus, 74
Cornus florida, 155; stolonifera, 111
Correction, Ophrydium; a, 32
Corrections of Professor Jones's List of Vascular Plants from St. Louis County, Minnesota, Some, 167
Corylus americana, f. missouriensis, 155
Corynella dubia, 382
Cosmos, 6
Cottonwoods, 367
Coursetia brachyrhachis, 381; glandulifera, 382; mollis, 382; ochroleuca, 382
Cracca, 197–199, 205–208, 222, 233, 315, 380–382; sp., 205, 208; adunca, 377; affinis, 256; ambigua, 305, 316; angustifolia, 276; angustissima, 305, 377; aniloides, 380; arcuata, 242; astragalina, 380; axillaris, 353, 355; benensis, 378; bicolor, 380; bracteolata, 376; Brandegei, 378; brevipes, 378; californica, 284, 287; calva, 256, 258, 259; cana, 284; caribaea, 380, var. Edwardsii, 380, 381, var. glandulifera, 380, f. dubia, 381; Carpenteri, 312, 314; cathartica, 378; Chapmanni, 312, 314; chrysophylla, 311, 316; chrysophylla Chapmanni, 312; cinerea, 378; collina, 381; constricta, 381; Conzattii, 259; corallicola, 378; corumbae, 381; crassifolia, 353; cuernavacana, 261; Curtissii, 378; decumbens, 378; diversifolia, 369; dolichocarpa, 381; domingensis, 378; Edwardsii, 381, var. glabella, 381, var. sericea, 381; filiformis, 381; flexuosa, 293, 297; foliolosa, 246; floridana, 315–317; frutescens, 381; glabrescens, 381; glandulifera, 382; gracillima, 305; grandiflora, 372; Greenmannii, 382; hamata, 288, 289; heterantha, 382; Heydeana, 242; hirta, 378, 379; hispidula, 299; holosericea, 267, 276; hypoleuca, 338, 339, 372, 378, 379; intermedia, 315–317; Kuntzei, 382; lanata, 353, 356; Langlassei, 345; latidens, 267, 275; leguminibus retrofalcatis, etc., 292; leiocarpa, 256; leptostachya, 378; leucantha, 262, 264, 265; leucosericea, 267; Lindheimeri, 321; littoralis, 379; lupinoides, 360; macrantha, 247; madrensis, 320; major, 361; Micheliana, 361; micrantha, 382; Mohrii, 267, 275; mollis, 382; multifolia, 242; nicaraguensis, 332; nitens, 336; noctiflora, 379; ochroleuca, 382; onobrychoides, 276, 280; oroboides, 382; pachypoda, 360; Palmeri, 288; Perriniana, 378, 379; piscatoria, 379; platyphylla, 371; potosina, 324; Pringlei, 330; pumila, 382; purpurea, 233, 379; rhodantha, 283; Roseana, 262, 264; Rugelii, 290; Rusbyi, 379; Schiedeana, 251; Schottii, 379; Seemanni, 328; Senna, 380; sericea, 351, 381, 382;

Smallii, 315; spicata, 292, var. flexuosa, 293; spicata flexuosa, 293; stipularis, 382; submontana, 335; syriaca, 198; talpa, 332; tenella, 380; tepicana, 318; texana, 276, 280; Thurberi, 265; toxicaria, 249; velutina, 353, 360, 382; venosa, 382; vicioides, 380; villosa, 380, δ. cinerea, 380; virginiana, 267, 275, 292; virginiana holosericea, 267; Vogelii, 376; Wallichii, 380; Watsoniana, 351
Crafordia, 234; bracteata, 234, 380
Crataegus coccinea, var. macracantha, 111; succulenta, var. macracantha, 111
Creeping Speedwell, 365
Crepis pulchra, 145
Crocanthemum, 366; canadense, 366
Crocus, 6
Croomia, 125
Cryptantha Jamesii, var. multicaulis, 20
Ctenium aromaticum, 127
Cynoglossum boreale, 6, 8
Cyperus brevifolius, 119, 120, in Fairfield County, Connecticut, 119; erythrorhizos, 11; filiculmis, var. macilentus, 10
Cypripedium reginae, 12
Cystopteris bulbifera, 148; fragilis, 109, 167
Cytisus ? 2, 249; sessiliflorus, 380

Dalbergia, 380
Dalea formosa, 20, 24; Jamesii, 20; Mutisii, 381
Dasystoma calycosa, 84
Daucus Carota, 26; pusillus, 26
Death of Charles Alfred Weatherby [Notice], 152
Decodon verticillatus, 111, 117, var. laevigatus, 111
Delphinium, 6
Dentaria,53
Derris, 201
Deschampsia, 7; elongata, 7
Desmodium rotundifolium, 155
Devil's shoestring, 209
Dianthus, 367; Armeria, 24; barbatus, 8; caesius, 367; plumarius, 8
Diapensia, 367
Dicentra canadensis, 30; Cucullaria, 30, f. purpuritincta, 30, in Quebec, 30
Dicranum arcticum, 29, 30, occur in southern central Quebec? Does, 29; Bonjeani, 30, 123; fuscescens, 123; scoparium, 30, 123; Starkei, 123
Diervilla sessilifolia, 60, in Virginia, 60
Digitalis, 6; sanguinalis, 8
Diodia virginiana, 20
Dionaea, 301; muscipula, 126
Diospyros, 105; virginiana, 105, 106
Distribution of Butomus umbellatus in the Great Lakes Region, Further, 385; of North Carolina Plants—I, Notes on, 129
Dix, W. L., Potentilla procumbens in the United States, 390
Does Dicranum arcticum occur in southern central Quebec?, 29
Dracocephalum, 121; Correllii, 120; virginianum, 121
Drepanocladus uncinatus, var. typicus, 123
Dulichium arundinaceum, 117
Durham, New Hampshire and Vicinity, Carya ovalis and Carya glabrata, in, 150

Eastern White Pine, An Unusual Station for, 393
Echinocactus texensis, 25
Echinochloa, Some Notes on, 1; colonum, 3, 147; crus-pavonis, 3, var. **decipiens, 3**; crusgalli, 1–3, 11; echinata, var. decipiens, 3; frumentacea, 3, 8; muricata, 1, 2, var. ludoviciana, 2, var. microstachya, 2, var. multiflora, 2, var. occidentalis, 2; occidentalis, 2; pungens, 1–3, var. coarctata, 2, 3, var. occidentalis, 2, var. **Wiegandii, 2**; Walteri, 3, 11; zelayensis, 3
Echinospermum virginicum, 111
Elderberry, 156
Eleocharis palustris, 110, 168; Smallii, 110, 168; tenuis, 110; tuberculosa, 108, 110
Elymus riparius, 127
Emendation of Nitella Morongii, Monographic Studies on the Characeae, I., 13, pl. 1119
Emendations in the Order Tubiflorae, 70–85, pls. 1144, 1145
Ephedra antisyphilitica, 21
Epilobium glandulosum, 99; hirsutum, 149
Epipactis, 163; Helleborine, 162–164, again, 162, var. viridans, 163; latifolia, 163; viridiflora, 163
Eragrostis hypnoides, 11, 127; multicaulis, 8, 127; peregrina, 8, 127

Erebinthus, 292
Erigeron divergens, var. cinereus, 23, 28
Eriogonum Jamesii, 20; lachnogynum, 20; tenellum, 20, 24
Eriophorum alpinum, 110; tenellum, 168
Eriosema, 381; grandiflorum, 381
Erodium moschatum, 8
Errors of Citation in Agrostis and Convolvulus, 192
Erucastrum gallicum, 148
Eryngium prostratum, 20
Erysimum inconspicuum, 8
Eschscholzia, 6
Euonymus americanus, 155
Euosmus Benzoin, 159; Diospyrus, 159
Eupatorium anomalum, 141; cordigerum, 131, 142; cuneifolium, 142; leptophyllum, 142; linearifolium, 142; recurvans, 143; rotundifolium, 142; rugosum, 111; sessilifolium, 108, 111; tortifolium, 142, 143; urticaefolium, 111
Euphorbia corollata, 111, 120
Euphorbiaceae, 208
Evers, Robert A., Setaria Faberii in Illinois, 391

Fairfield County, Connecticut, Cyperus brevifolius in, 119
False pignut, 150
Fassett, N. C., Herbarium Technique, 59; Some Notes on Echinochloa, 1
Fernald, M. L., A most useful Series of Illustrations (Review), 31; An abbreviated Flora of Maine (Review), 5; An Indispensable Bibliography (Review of Rehder's Bibliography of Cultivated Trees and Shrubs), 365; Bibliography of Charles Alfred Weatherby, 179; Blackberries, old and new, 43–51, pls. 1130–1132; Charles Alfred Weatherby, Botanist and Helper of Botanists (with Portrait), 169; Chenopodium hybridum, var. Standleyanum, 92; Emendations in the Order Tubiflorae, 70–85, pls. 1144, 1145; Errors of Citation in Agrostis and Convolvulus, 192; Grasses of North Carolina (a friendly Critique), 124; Hypericum adpressum, forma spongiosum, 112; Rhizome-characters in and minor Forms of Viola, 51–57, pls. 1133–1136; Some Identities in Breweria, 35–43, pls. 1121–1129; Some Northern Astereae, 93–103, pls. 1146–1150; Some Varieties in Oenothera, 61–70, pls. 1137–1143; Studies of Eastern American Plants, 43–57, 61–85, 93–104, pls. 1137–1150; Transfers and minor Variations, 103
Festuca obtusa, 125
Fimbristylis Vahlii, 21
Flora of Maine (Review), An abbreviated, 5; "of Windham New Hampshire", Additions to the Harris, 107
Fordia, 222
Form of Aster puniceus, var. firmus The White, 231
Four Virginia Plants, Notes on, 12
Fox, William B., Notes on Distribution of North Carolina Plants—I, 129
Fraxinus nigra, 12; profunda, 155; tomentosa, 155
Friedlander, Herbert, Additions to the Harris "Flora of Windham, New Hampshire", 107
Froelichia floridana, 134
Fumaria, 31, 32; Bastardii, 32; officinalis, 31
Funastrum, 58
Further Distribution of Butomus umbellatus in the Great Lakes Region, 385

Gaiser, L. O., Further Distribution of Butomus umbellatus in the Great Lakes Region, 385
Galactia, 381, 382; Elliottii, 381; marginalis, 320
Galega, 197, 206, 220, 222, 267, 276, 292; ambigua, 305; caribaea, 198, 380; cathartica, 378, 382; chrysophylla, 311; cinerea, 378, 382; domingensis, 378, 379; filiformis, 381; florida, 305, 310, 311; frutescens, 381; frutescens, flore purpurea, etc., 249; grandiflora, 372; hirta, 378, 379; hispidula, 299, 305; linearis, 379; littoralis, 379; longifolia, 382; ochroleuca, 382; paucifolia, 292; Perriniana, 378; piscatoria, 379; polygama, 382; purpurea, 379; rosea, 372; sericea, 249; Sinapou, 249, 255; spicata, 276, 292; toxicaria, 249; villosa, 305, 310, 311, 380; virginiana, 267, 292; virginica, 267
Galium concinnum, 27, 120

Gangi, Dominic P., Carya ovalis and Carya glabrata in Durham, New Hampshire and Vicinity, 150
Gardens, Veronica filiformis a Weed of Lawns and, 365
Gaultheria procumbens, 139
Gerardia, subg. **Eugerardia, 84;** subg. **Otophylla, 84;** subg. **Panctenis, 84;** sect. Eugerardia, 84; sect. Otophylla, 84; **calycosa, 84;** flava, var. **macrantha, 84;** grandiflora, var. **pulchra, 84;** pedicularia, var. **austromontana, 85;** var. **intercedens, 85**
Geum album, 111; aleppicum, var. strictum, 111, 168; laciniatum, 111; strictum, 168; virginianum, 111
Gilia Jassajarae, 79; laxiflora, 20, 26; Sonorae, 79
Gillenia stipulata, 20
Gingko biloba, 6, 8
Glossopetalon planitierum, 20
Glyceria acutiflora, 107, 109, 117; arkansana, 127; obtusa, 109; pallida, 109
Glycyrrhiza lepidota, 148
Godfrey, R. K., Change of Status for two Species of Chrysopsis, 113; Notes on Distribution of North Carolina Plants—I, 129
Goodia lotifolia, 207
Goodyera repens, 110, var. ophioides 110
Grasses new to West Virginia, Some, 106; of North Carolina (a friendly Critique), 124
Gratiola lutea, var. glaberrima, 84; neglecta, var. **glaberrima, 84**
Gray Herbarium of Harvard University,—Contributions from the, No. CLXIX, 35–57, 61–85, 93–104, pls. 1121–1150; No. CLXX, 193–231, 233–302, 305–364, 369–384, pls. 1152–1155
Great Lakes Region, Further Distribution of Butomus umbellatus in the, 385
Gymnocladus dioica, 6

Habeeb, Herbert, New Moss from Nebraska, 128; Zoochlorella conductrix occurring in New Brunswick Symbiotically with Ophrydium, 4
Habenaria, 23; blephariglottis, 10; ciliaris, 23; clavellata, var. ophioglossoides, 110; fimbriata, 110; Hookeri, 110; lacera, 23; leucophaea, 23; orbiculata, 110; tridentata, 110
Halimium, 366
Hamamelis, 105
Hara, Hiroshi, Note on Chrysosplenium iowense, 191
Hard Pines, 367
Harris "Flora of Windham, New Hampshire", Additions to the, 107
Harvard University,–Contributions from the Gray Herbarium of, No. CLXIX, 35–57, 61–85, 93–104, pls. 1121–1150; No. CLXX, 193–231, 233–302, 305–364, 369–384, pls. 1152–1155
Helenium, 303; brevifolium, 304; Curtisii, 304, in Virginia, 303; floridanum, 145; nudiflorum, 145
Heleochloa schoenoides, 11
Helianthemum, 366; canadense, 366, 367
Helianthus ciliaris, 28
Heliotropium indicum, 21
Hepatica americana, 110; triloba, 110
Heracleum lanatum, 111
Herbarium Technique, 59
Heterophyllium Haldanianum, 123
Heuchera puberula, 117, f. **glabrata, 117**
Hibiscus palustris, 137; Trionum, 8
Hickory, 150; red, 150
Hicoria, 85; borealis, 85, 87, 89, Ashe, The Status of, 85; carolinae-septentrionalis, 85; microcarpa, 86; minima, 86; odorata, 87, 88, var. villosa, 87; ovalis borealis; ovata, 85, 86
Hickories, 86
Hieracium aurantiacum, 8, 112, 390
Hilaria Jamesii, 19
Hodgdon, A. R., Additions to the Harris "Flora of Windham, New Hampshire", 107; Carya ovalis and Carya glabrata in Durham, New Hampshire and Vicinity, 150
Hoffmanseggia drepanocarpa, 24
Hordeum brachyantherum, 99
Hottonia inflata, 117
Houstonia purpurea, 120
Hovea linearis, 207
Hull, Edwin D., Two Species of Oxybaphus in Indiana, 3
Hunnewell, Francis Welles, Diervilla sessilifolia in Virginia, 60; Some Grasses new to West Virginia 106
Hyacinth, wild, 116

Hybanthus concolor, 148
Hydra, 4
Hydrastis canadensis, 148, 155
Hydrochloa caroliniensis, 125
Hydrolea ovata, 21
Hymenostomum rostellatum, 128
Hypericum adpressum, 112, forma spongiosum, 112, f. **spongiosum, 112,** var. spongiosum, 112
Hystrix patula, 109

Identities in Breweria, Some, 35–43, pls. 1121–1129
Illinois or to the Chicago Area in Illinois, Plants New to, 147; Salicornia europaea in, 11; Setaria Faberii in, 391
Illustrations (Review), A most useful Series of, 31
Indiana, Two Species of Oxybaphus in, 3
Indigofera excelsa, 364; mucronata, 381; Perriniana, 339, 372, 378, 379
Indispensable Bibliography (Review of Rehder's Bibliography of Cultivated Trees and Shrubs), An, 365
Ipomoea pandurata, 75, f. **leviuscula, 75,** var. rubescens, 75
Iridaceae, 208
Iris pumila, 8
Isoëtes Engelmanni, 117; melanopoda, f. **pallida, 103,** var. pallida, 103

Jacob's-ladder, 7, 76
Jeffersonia diphylla, 147, 148
Jones's List of Vascular Plants from St. Louis County, Minnesota, Some Corrections of Professor, 167
Juglans, 105
Juncus effusus, 390; Greenei, 9, 10, and Rhus glabra in Quebec, 9; macer, 9; militaris, 110; tenuis, 9
Junipers, 367
Juniperus monosperma, 19
Jussiaea leptocarpa, var. genuina, 117
Justicia lanceolata, 21

Kiaeria glacialis, 29; Starkei, 122, 123, in Quebec, Range of, 122
Kiesera, 233; candida, 374; sericea, 233, 374
Kneiffia latifolia, 68; tetragona, var. hybrida, 68
Kraunhia, 222
Kucyniak, James, Does Dicranum arcticum occur in southern central Quebec?, 29; Range of Kiaeria Starkei in Quebec, 122
Kyllinga, 22; brevifolia, 20, 22, 119; pumila, 22

Labiatae, 208
Lactuca scariola, var. integrata, 112
Lakela, Olga, Some Corrections of Professor Jones's List of Vascular Plants from St. Louis County, Minnesota, 167
Lapithea gentianoides, 140
Lappula echinata, 111
Lathyrus myrtifolius, 136; "paluster, var. myrtifolium", 136; palustris, 136, var. genuinus, 136, var. myrtifolius, 136
Laurus Benzoin, 159; diospyroides, 153; Diospyrus, 153; geniculata, 153, 154; melissaefolia, 153
Lawns and Gardens, Veronica filiformis a Weed of, 365
Lechea intermedia, var. laurentiana, 10
Leersia hexandra, 127; lenticularis, 126; oryzoides, 119
Leguminosae, 203, 206; Tribe Galegeae, 193, 204, 222, subtribe Craccanae, 222, subtribe Millettianae, 222, subtribe Tephrosieae, 222, subtribe Tephrosiinae, 219, 222; Tribe Phaseolae, 381
Leonotis nepetaefolia, 141
Lepidium ruderale, 8
Leptodactylon caespitosum, 24
Leucophysalis, 82; grandiflora, 82
Leucospora multifida, 149
Liatris, A necessary Transfer in, 34; aspera, f. **Benkii, 104;** borealis, f. **albiflora, 104;** dubia, 104; graminifolia, 35, var. dubia, 35, 104, var. **racemosa, 35,** 104, var. Smallii, 143, var. **virgata, 104;** novae-angliae, f. albiflora, 104; scariosa, f. Benkii, 104; spicata, γ. racemosa, 35; virgata, 104
Lilium canadense, 304; Catesbaei, var. Longii, 131; philadelphicum, 10
Linaria canadensis, 10; minor, 118
Lindera, 154, 160, 162; Benzoin, 153, 154, 156–162, var. pubescens, 155, 159, 161, 162; melissaefolia, 153–162, pl. 1151
Linum usitatissimum, 8
Liparis Loeselii, 12, 117
List of Vascular Plants from St. Louis County, Minnesota, Some

Corrections of Professor Jones's, 167
Listera borealis, 99
Litsea aestivalis, 154
Loeflingia texana, 24
Lonchocarpus, 201
Long-leaf pine, 230
Lonicera albiflora, 27
Lotus oroboides, 382
Ludwigia glandulosa, 26, var. Torreyi, 26, var. typica, 21, 26; hirtella, 20, 26
Lycopodium clavatum 8; tristachyum, 109
Lycurus phleoides, 20
Lysimachia nummularia, 139
Lythrum Salicaria, 120

Macbridea pulchra, 141
Madia, 8; sativa, 145
Magnolia, 135; acuminata, 134, 135, var. aurea, 135, var. cordata, 134; cordata, 134; macrophylla, 135; tripetala, 135; umbrella, 136
Maine, Basicladia in, 232; (Review), An abbreviated Flora of, 5
Malvaceae, 208
Manning, Wayne E., The Status of Hicoria borealis Ashe, 85
Maple, 137
Medeola, 53; virginiana, 304
Medicago laciniata, 8
Melica mutica, 125, 127
Mentha piperita, 390; spicata, 390
Mentzelia multiflora, 20
Menyanthes trifoliata, var. minor, 117
Mikula, Bernard, Chromosomes of Trillium pusillum Michx., var. virginianum Fernald, 368
Millet, 391
Millettia, 222
Mimulus ringens, 119
Minnesota, Some Corrections of Professor Jones's List of Vascular Plants from St. Louis County,167
Mint, 141
Missouri Plant-records (1946–1948), New, 115
Mistletoe, 105, 106; on Persimmon, 105
Moneses grandiflora, 111; uniflora, 111
Monographic Studies on the Characeae. I. Emendation of Nitella Morongii, 13, pl. 1119
Moss from Nebraska, New, 128
Most useful Series of Illustrations (Review), A, 31
Muenscher, W. C., Veronica filiformis a Weed of Lawns and Gardens, 365
Muhlenbergia arenicola, 21; brachyphylla, 127; glabriflora, 127; racemosa, 127; Torreyi, 19
Mundulea, 222
Munroa squarrosa, 19
Musk-turtle, 232
Myosotis stricta, 108, 111
Myosurus minima, 31
Myrica cerifera, 110; pensilvanica, 110
Myriophyllum tenellum, 111
Myurella Careyana, 123

Najas flexilis, 111; gracillima, 109; indica, var. gracillima, 109
Nebraska, New Moss from, 128
Necessary Transfer in Liatris, A, 34
Nelumbo nucifera, 207
Neocracca heterantha, 382; Kuntzei, 382
New Missouri Plant-records (1946–1948), 115; Moss from Nebraska, 128; Polemonium from eastern Pennsylvania, A, 76, pls. 1144, 1145; Species of Sarcostemma from Oklahoma, A, 58; to Illinois or to the Chicago Area in Illinois, Plants, 147
New Brunswick Symbiotically with Ophrydium, Zoochlorella conductrix occurring in, 4
New Hampshire and Vicinity, Carya ovalis and Carya glabrata in Durham, 150
Nitella, 15; batrachosperma, 16, 17; gracilis, 14–17, f. brachyphylla, 14, 17; maxceana, 16, 17, pl. 1119; minuta, 16; Morongii, 13–16, 18, pl. 1119, Monographic Studies on the Characeae. I. Emendation of, 13, pl. 1119; translucens, 18
North Carolina (a friendly Critique), Grasses of, 124; Plants—I, Notes on Distribution of, 129
Note on Chrysosplenium iowense, 191
Notes on Distribution of North Carolina Plants—I, 129; on Echinochloa, Some, 1; on four Virginia Plants, 12
Nymphaea odorata, 8
Nyssa sylvatica, 105, var. caroliniana, 116

Oak, 132, 367

Occurring in New Brunswick Symbiotically with Ophrydium, Zoochlorella conductrix, 4
Oenothera, 46, Some Varieties in, 61–70, pls. 1137–1143; § Onagra, 61; angustissima, 65; argillicola, 61, 70, pl. 1138; biennis, 61, 62, 64, 66–69, pl. 1137, var., 63, var. canescens, 63, 69, pl. 1138, ε. cruciata, 66, var. hirsutissima, 63, 64, 69, pl. 1138, var. nutans, 63, 65, 69, pl. 1137, var. Oakesiana, 66, var. vulgaris, 62; canovirens, 69, pl. 1138; comosa, 62; cruciata, 66–68, 70, pls. 1139, 1140, var. **sabulonensis, 67,** 70, **pl. 1142,** var. **stenopetala, 67,** 68, 70, pl. 1143; eriensis, 63; Fraseri, 68; glauca, 68, 69; grandiflora, 61; grandifolia, 62; Hazelae, 62; hybrida, 68; Lamarckiana, 61; lavandulaefolia, 20; muricata, 62, 64, 66; niagarensis, 63; novaescotiae, 62; nutans, 63; Oakesiana, 65, 66, 68; parva, 62; parviflora, 64–67, 70, pl. 1139; var. angustissima, 65, 70, pl. 1139, var. **Oakesiana, 66,** 70, pls. 1139, 1140; repandodentata, 63; Royfraseri, 62; stenopetala, 67, 68, 70, pl. 1143; strigosa, 63; tetragona, var. Fraseri, 68, f. hybrida, 68, f. latifolia, 68, var. **hybrida, 68,** 69, var. **latifolia, 68,** 69; Tidestromii, 66, 70, pl. 1140; Victorini, 62
Oklahoma, A new Species of Sarcostemma from, 58; Some Results of a Summer's Botanizing in, 18
Oldenlandia Boscii, 118
Onagra biennis, var. strigosa, 63; Oakesiana, 66; strigosa, 63
Onoclea Struthiopteris, 109
Onopordum, 33
Ophioglossum vulgatum, 7, 109, var. pseudopodum, 7, 10, 109
Ophrydium, 4, 32; a Correction, 32; Zoochlorella conductrix occurring in New Brunswick Symbiotically with, 4; versatile, 4; sp., 4
Opuntia arborescens, 19
Orchis leucophaea, 23
Order Tubiflorae, Emendations in the, 70
Orobanche uniflora, 111
Orobus sericeus, 251; virginianus, 292
Oryzopsis asperifolia, 109; canadensis, 109; hymenoides, 59; pungens, 109
Osmunda regalis, var. spectabilis, f. **nana, 103**
Oval pignut, 150
Oxalis, 391
Oxybaphus in Indiana, Two Species of, 3; hirsutus, 3; linearis, 3
Oxypolis ternata, 138

Paeonia, 6
Panctenis, 84
Panicum, 115; caerulescens, 127; Hallii, 20; hians, 127; laxiflorum, 109; obtusum, 19; oligosanthes, var. Scribnerianum, 107, 109; virgatum, 20; Wrightianum, 127; yadkinense, 127
Paronychia canadensis, 108, 110; sessiliflora, 20, 24
Paspalum, 115, 124; bifidum, 126; ciliatifolium, var. Muhlenbergii, 109; fluitans, 126; lentiferum, 127; praecox, 126; racemulosum, 126; setaceum, 109
Passiflora lutea, 29, Polyploidy in, 29
Pastinaca sativa, 8
Pedicularis Furbishiae, 8; lanceolata, 117
Pellaea glabella, 148
Penstemon australis, 84, f. **odontophyllus, 84;** brevisepalus, 84, f. **heterolasius, 84;** Brittonorum, 84; canescens, 83; canescens brittonorum, 84; canescens, f. **Brittonorum, 84,** f. **villicaulis, 83;** hirsutus, 111; pubescens, 111; tubaeflorus, 83, var. **achoreus, 83**
Periandra, 381
Pericome glandulosa, 20
Persimmon, 105, 106; Mistletoe on, 105
Perularia flava, 23
Petalostemum decumbens, 25
Petasites, 98; palmatus, 98; speciosus, 98
Peteria, 222
Philadelphus, 6
Philibertia, 58
Phlox, 77, 367; alba, 81; bifida, 78, 79, var. **cedaria, 78**–80, [var.] stellaria, 80; bifida stellaria, 78; Brittonii, 78; divaricata, 80, f. albiflora, 81, f. **Coulteri, 80,** var. Laphamii, 80; divaricata candida, 81; maculata, 81, β. candida, 82, f. **immaculata, 81,** var. candida, 81, var. purpurea, f. **candida, 82,** var. pyramidalis, 82, var. b.

suaveolens, 81; nivalis, 78, f. **roseiflora, 78;** pyramidalis, 82; Stellaria, 78–80, var. cedaria, 79, var. b. cedaria, 78, 79; suaveolens, 81, 82; subulata, 367, [var.] australis, 78, [var.] brittonii, 78, var. Brittonii, f. **austalis, 78**
Phoradendron, 105, 106; flavescens, 105, 106
Physalis, 83; sp., 59; barbadensis, 82; barbadensis obscura, 82; barbadensis, var. **glabra, 82,** var. obscura, 82; Fendleri, 59; grandiflora, 82; heterophylla, 111; obscura, 82, var. α. glabra, 82, var. β. viscido-pubescens, 82; virginiana, 111
Physostegia, 120, 121; angustifolia, 122; Correllii, 120; **Correllii, 120,** 121; Digitalis, 122; intermedia, 122; speciosa, 121; virginiana, 121
Picea Abies, 366; rubens, 366
Pignut, 150; false, 150; oval, 150; sweet, 150
Pine, An Unusual Station for Eastern White, 393; Long-leaf, 230
Pines, Hard, 367; Soft, 367
Pinus australis, 230; Banksiana, 9; cembroides, var. edulis, 19, 23; echinata, 116; Mugo, 6; Strobus, 8, 393; Taeda, 20, 28
Pityopsis, 114
Planera aquatica, 133
Plant-records (1946–1948), New Missouri, 115
Plantago Purshii, 24
Plants New to Illinois or to the Chicago Area in Illinois, 147; Notes on four Virginia, 12; of St. Louis County, Minnesota, Some Corrections of Professor Jones's List of Vascular, 167
Plastic Collecting Bag, A Simple, 393
Platysepalum, 222
Poa Chapmanniana, 127; cuspidata, 127; eminens, 99; paradoxa, 127
Poecilanthe, 222
Pogonia ophioglossoides, 116
Poison Sumach, 10
Poissonia, 222
Polemoniaceae, 76
Polemonium caeruleum, 7, 76; **Longii, 76, 77, pl. 1144;** reptans, 76, 77, pl. 1145; Van-Bruntiae, 7, 76–78, pl. 1145
Polygala brevifolia, 136; Hookeri, 136, 137; sanguinea, 111
Polygonum sagittatum, 119
Polyploidy in Passiflora lutea, 29
Polypodium polypodioides, 21
Polypogon monspeliensis, 126
Pondberry, 156, 159
Populus: a Correction, 149; balsamifera, var. Fernaldiana, 149, var. Michauxii, 149, var. subcordata, 150; tremuloides, 6, 47, var. magnifica, 6
Potamogeton amplifolius, 109; Berchtoldi, var. polyphyllus, 109, var. tenuissimus, 109; confervoides, 8
Potentilla anglica, 390, 391; canadensis, 111; procumbens, 390, in the United States, 390; recta, 24, 111; simplex, 111
Prenanthes altissima, 112; trifoliolata, 112
Prunus susquehanae, 10; virginiana, 20, var. melanocarpa, 20
Psoralea argyrophylla, 20
Pteretis pensylvanica, 109
Pteridophyta, 109
Pterigoneurum subsessile, var. **Kieneri, 128**
Ptychosema, 222
Puccinellia paupercula, var. alaskana, 7; pumila, 7
Pyrola asarifolia, 103, var. incarnata, 103, var. **purpurea, 103;** rotundifolia, β. incarnata, 103, β. purpurea, 103
Pyrus, 366; aucuparia, 111; arbutifolia, var. melanocarpa, 111; melanocarpa, 111

Quebec, Dicentra Cucullaria f. purpuritincta in, 30; Does Dicranum arcticum occur in southern central, 29; Juncus Greenei and Rhus glabra in, 9; Range of Kiaeria Starkei in, 122
Quercus spp., 19; alba, 231; bicolor, 132; grisea, 19, 23; incana, 231; lyrata, 132; palustris, 155; phellos, 132, f. intonsa, 132; prinus, 132; pumila, 133; virginiana, 133, f. macrophylla, 133, var. geminata, 133

Range of Kiaeria Starkei in Quebec, 122
Ranunculus acris, 390; alismaefolius, 166; ambigens, 164–166, var. obtusiusculus, 166; circinatus, 31; delphinifolius, 110; flabellaris, 110; Flammula β. laxicaulis, 167, var. laxicaulis, 166, var. major,

166; hispidus, 134; laxicaulis, 164–167, (T. & G.) Darby, Ranunculus texensis Engelm. antedated by, 164, var. mississippiensis, 166; mississippiensis, 166; oblongifolius, 164, 166; obtusiusculus, 166; pusillus, 166, var. denticulatus, 166; reptans, 31; septentrionalis, 134; texensis, 165, 166, Engelm. antedated by R. laxicaulis (T. & G.) Darby, 164; trichophyllus, 31
Raymond, Marcel, Dicentra Cucullaria f. purpuritincta in Quebec, 30; Juncus Greenei and Rhus glabra in Quebec, 9
Red hickory, 150
Results of a Summer's Botanizing in Oklahoma, Some, 18
(Review), A most useful Series of Illustrations, 31; (of Rehder's Bibliography of Cultivated Trees and Shrubs), An Indispensable Bibliography, 365
Rhexia ciliosa, 131, 137, 138; mariana, var. leiosperma, 20
Rhizome-characters in and minor Forms of Viola, 51–57, pls. 1133–1136
Rhododendron, 367; cumberlandense, 367
Rhus, 367; glabra, 10, in Quebec, Juncus Greenei and, 9; × hybrida, 10; microphylla, 25; trilobata, var. pilosissima, 19, 25; typhina, 10, 111; Vernix, 10
Rhynchosia sessiliflora, 380
Rhynchospora Baldwinii, 130; debilis, 130; divergens, 130; gracilenta, 130; microcarpa, 131; mixta, 131; perplexa, 131
Ribes, 24; cereum, 20, 24
Robinia candida, 374; sericea, 374
Rorippa hispida, 168; islandica, var. hispida, 168
Rotala ramosior, var. interior, 21
Rouleau, Ernest, Populus: a Correction, 149
Rubus, 367; § Allegheniensis, 45, 46, 49, 50; § Arguti, 47, 49, 50; § Canadenses, 49; § Setosi, 46; allegheniensis, 44, 45, 47, 50, f. **calycosus, 44,** f. **suffultus, 43,** 44, 50, **pl. 1130,** var. calycosus, 44, var. Gravesii, 43, var. **populifolius, 47, pl. 1130;** alumnus, 45, 46; Andrewsianus, 47, 48; apianus, 45; auroralis, 45; Bigelovianus, 46, 47; canadensis, 49, var. pergratus, 49; deliciosus, 20, 24; glandicaulis, 51; longissimus, 45; marilandicus, 45; nigrobaccus, 45, var. calycosus, 44; orarius, 50; pensilvanicus, 47–50, f. **phyllophorus, 49;** pergratus, 47, 49; philadelphus, 47–49; pugnax, 50; Rappii, 45; Rosa, 45, 46; setosus, 47; **sceleratus, 50,** 51, **pls. 1131, 1132;** separ, 45; strigosus, 49; uber, 45; virginianus, 45
Rudbeckia missouriensis, 28
Ruellia pedunculata, f. **Baueri, 118**
Rumex Acetosella, 8; occidentalis, 167; Patientia, 167; pulcher, 23

Sabal minor, 21
Sabatia chloroides, 140; dodecandra, 140; gentianoides, 131, 137, 140, 141
St. Louis County, Minnesota, Some Corrections of Professor Jones's List of Vascular Plants from, 167
Salicornia, 11; europaea, 11, in Illinois, 11
Salix alba, 168; caroliniana, 116; gracilis, 7; petiolaris, 7; vitellina, 168
Sambucus canadensis, 156
Sarcodum, 222
Sarcostemma, 58, from Oklahoma, A new Species of, 58; crispum, 58; heterophylla, 58; **lobata, 58,** 59
Sarracenia, 301
Savins, 367
Schubert, Bernice G., Bibliography of Charles Alfred Weatherby, 179; Some Identities in Breweria, 35–43, pls. 1121–1129
Sciadopitys vericillata, 6
Scirpus carinatus, 22; etuberculatus, 115; hudsonianus, 110; koilolepis, 22
Sclerotium Rolfsii, 365
Scrophularia lanceolata, 111; nodosa, var. marilandica, 111
Sedge, 119, 120
Selaginella apoda, 109; apus, 109
Sempervivum tectorum, 8
Senecio longilobus, 20; Pseudo-Arnica, 99; resedifolius, 99; tridenticulatus, 20, 28; vulgaris, 112
Senior, Robert M., Campanula Rentonae, sp. nov., 302
Senna, Wild, 203
Serapias Helleborine, 163
Series of Illustrations (Review), A most useful, 31
Setaria, 391, 392; Faberii, 391, 392,

in Illinois, 391; italica, 8; lutescens, 392; viridis, 392
Shinners, Lloyd H., Aster coerulescens the same as A. praealtus, 91; Aster ontarionis the same as A. pantotrichus (A. missouriensis), 89; Physostegia Correllii, 120
Silene, 367; acaulis, 367
Simple Plastic Collecting Bag, A, 393
Sisymbrium altissimum, 111
Sisyrinchium albidum, 8
Sitanion Hystrix, 19, 20
Smilax rotundifolia, 304
Soft Pines, 367
Solanum Torreyi, f. **album, 27**; tuberosum, 8
Solidago, 83, 97; chrysolepis, 94; humilis, 93, 94, pl. 1146; neglecta, 93; nemoralis, 101; patula, 119; puberula, 111; Purshii, 93, 94, pl. 1146, not S. chrysolepis, 93; racemosa, 94; uliginosa, 93, 94; ulmifolia, 112; uniligulata, 93
Some Corrections of Professor Jones's List of Vascular Plants from St. Louis County, Minnesota, 167; Grasses new to West Virginia, 106; Identities in Breweria, 35–43, pls. 1121–1129; Northern Astereae, 93–103, pls. 1146–1150; Notes on Echinochloa, 1; Results of a Summer's Botanizing in Oklahoma, 18; Varieties in Oenothera, 61–70, pls. 1137–1143
Sorbus americana, 111
Sorghastrum Elliottii, 127; nutans, 20
Species of Oxybaphus in Indiana, Two, 3; of Sarcostemma from Oklahoma, A new, 58
Speedwell, Creeping, 365
Speese, Bernice M., Chromosomes of Trillium pusillum Michx., var. virginianum Fernald, 368
Spermacoce glabra, 21
Spermatophyta, 109
Sphenoclea zeylanica, 141
Sphenopholis filiformis, 127
Spice Bush, 153, 156
Sphinctospermum, 204–208; constrictum, 204, 205, 208, 381, pl. 1152
Spiranthes praecox, 110; vernalis, 110
Spirodela polyrhiza, 110
Spongilla, 4
Sporobolus clandestinus, 125, 127; cryptandrus, 19; vaginaeflorus, 109
Stachys borealis, 168
Station for Eastern White Pine, An Unusual, 393
Status for two Species of Chrysopsis, Change of, 113; of Hicoria borealis Ashe, The, 85
Stellaria, 78; graminea, 110; pubera, 147, 148
Stephanomeria pauciflora, 20
Sternotherus odoratus, 232
Stevens, O. A., A Simple Plastic Collecting Bag, 393
Stewartia Malachodendron, 138
Steyermark, Julian A., Lindera melissaefolia, 153, pl. 1151; New Missouri Plant-records (1946–1948), 115; Plants New to Illinois or to Chicago Area in Illinois, 147
Stipa, 22; neomexicana, 22; Scribneri, 21, 22
Streptopus longipes, 168; roseus, 168
Studies on the Characeae. I. Emendation of Nitella Morongii, Monographic, 13, pl. 1119
Stylisma, 38; aquatica, 35, 37, 38; elliptica, 37, 38; evolvuloides, 40, β. angustifolia, 40, 42; trichosanthes, 37
Suaeda, 23; suffrutescens, 23
Sweet pignut, 150
Swink, Floyd A., Plants New to Illinois or to the Chicago Area in Illinois, 147
Sylitra, 222

Taraxacum erythrospermum, 112; laevigatum, 112
Taxodium distichum, 20
Taxus baccata, 366
Technique, Herbarium, 59
Tephrosia (Leguminosae), The American Barbistyled Species of, 193–231, 233–302, 305–364, 369–384, pls. 1152–1155, sect. Apodynomene, 223; sect. Eutephrosia, 223, 374; sect. Brissonia, 223; sect. Pogonostigma, 223; sect. Reineria, 223; sect. Requienia, 223; **Abbottiae**, 212, 217, 218, 237, **357**, 359, 363, **pl. 1155;** adscendens, 377; adunca, 377, 379, var. acutifolia, 377, var. genuina, 377, f. pseudomarginata, 377, var. guarantica, 377, 378, var. intermedia, 377, f. glabrior,

377, var. rufescens, 377, 379, f. grandifolia, 377, f. paraguayensis, 377, 379, var. subglabrata, 377; affinis, 256; albida, 336, 338; ambigua, 305, 311, var. gracillima, 305, 310, var. intermedia, 384; amorphaefolia, 380; angustifolia, 276, 279, 280; angustissima, 204, 205, 377, 379, pl. 1152; aniloides, 380; arcuata, 242; ascendens, 377; astragalina, 380; astragaloides, 201; Barclayi, 380; belizensis, 204, 205, 208, 211, 212, 228, 240, 241, 343, 345, 346, 363, pl. 1152; bracteolata, 216, 219, 235, 239, 372, 376, 377; Brandegei, 378; brevipes, 378, 380; cana, 205, 208, 212, 217, 236, 284, 286, 287, 323; candida, 203, 220, 233, 237, 256, 372, 374, 376; caribaea, 380; Carpenteri, 312; cathartica, 203, 378, 380; chilensis, 381; chrysophylla, 204–206, 209, 212, 220, 230, 231, 236, 301, 309–311, 314–318, 343, pl. 1152, var. Chapmanni, 312; chrysophylla × T. florida, 210, 237, 315, 384;cinerea, 203, 205, 211, 219, 220, 231, 284, 378–380, β. littoralis, 378, 379, var. typica, 378, f. pseudoadunca, 378, γ. villosior, 378; coerulea, 381; constricta, 381; Conzattii, 204–206, 208, 212, 216, 225, 226, 235, 250, 259, 262, pl. 1152; craccoides, 381; crassifolia, 212, 216, 239, 349, 353–355, 357, 360, 363, 364; cuernavacana, 212, 215, 216, 235, 250, 260, 261; decumbens, 378; diversifolia, 212, 213, 217, 238, 359, 363, 369, 372; dolichocarpa, 381; domingensis, 378; egregia, 378; elegans, 299; ?Elliottii, 381; emarginata, 249; filiformis, 381; flexuosa, 292, 293; **florida**, 204–206, 209, 212, 214, 220, 230, 231, 236, 273, 282, 301, 302, **305**, 308–310, 315–318; pl. 1152; foliolosa, 204, 205, 208, 212, 214, 216, 240, 246, 250, pl. 1152; frutescens, 381; fruticosa, 381; glabrescens, 381; glandulifera, 382; gracillima, 204, 305; gracilis, 299; grandiflora, 205, 208, 211, 215, 223, 233–235, 372, 374; guaranitica, 377, 378; gynothrix, 378; hamata, 288; Hassleri, 378; heterantha, 382; Heydeana, 242; hispida, 292; hispidula, 204, 205, 209, 212, 214, 230, 231, 237, 273, 297, 299, 301, 302, 308–310, pl. 1152, γ., 292; holosericea, 267, 276; Hookeriana, 204; hypoleuca, 212, 237, 338, 339, 341, 378; intermedia, 315; lanata, 212, 216, 228, 239, 354, 355, 357, 363, var. velutina, 353, 360; Langlassei, 211, 212, 226, 228, 240, 242, 323, 345, 347–349, 364; latidens, 201, 267; leiocarpa, 205, 208, 212, 225, 228, 235, 247, 250, 256, 258, 260, 265; leptostachya, 378, β. leptophylla, 379; leucantha, 208, 212, 215, 218, 229, 238, 262, 266, 323, 335, var. acuta, 262, 264, 265; leucosericea, 267, 274; Lindheimeri, 205, 212, 218–220, 224, 228, 231, 239, 309, 321, 324–327; linearis, 339, 372, 378, 379; littoralis, 284, 379; longifolia, 382; lupinoides, 360; macrantha, 203, 212, 219, 220, 237, 247, 249, 250, 364; macropoda, 201; madrensis, 212, 219, 224, 225, 235, 236, 241, 319, 321, 353; major, 212, 213, 238, 248, 345, 347, 354, 359, 361, 363; marginata, 379, var. cinerascens, 379, var. pseudo-rufescens, 379; **mexicana**, 212, 241, **344–346**, 363, **pl. 1153**; mollis, 382; mollissima, 293; moschata, 382; multiflora, 276, 280; multifolia, 200, 202, 205, 208, 211, 212, 214, 216, 220, 225, 226, 228, 229, 239, 241, 242, 246, 247, 250, 251, 255, 256, 284; nervosa, 379; nicaraguensis, 211, 212, 218, 226, 240, 241, 250, 332, 334, 364; nitens, 204, 205, 208, 212, 225, 226, 228, 229, 323, 336, 338, 364, pl. 1152, var. lanata, 336, 338; noctiflora, 203–205, 208, 220, 372, 378, 379, pl. 1152; ochroleuca, 382; onobrychoides, 205, 206, 212, 214, 217, 218, 225, 228, 230, 240, 241, 273, 276, 280–282, 302, 310, var. texana, 277; oroboides, 382; pachypoda, 212, 213, 238, 353, 359–361, 363; Palmeri, 205, 208, 212, 236, 237, 287, 289, 290, 323; pauciflora, 276; paucifolia, 292; penicillata, 379; Perriniana, 378, 379; piscatoria, 379; platyphylla, 212, 213, 215, 238, 353, 359, 363, 371, 372; **pogonocalyx**, 212, 217, 242, **341**, 363, **pl. 1153**; potosina, 205, 206, 212, 218–220, 224, 228, 231, 240, 309, 323–327; Pringlei, 211, 212, 225, 226, 239, 330, 351, 363;

procumbens, 379; prostrata, 311; Purisimae, 287, 289; purpurea, 372, 377, 379, 380, var. angustissima, 377, 379; **quercetorum,** 212, 242, **349,** 351, 359, 363, **pl. 1154;** rhodantha, 205, 208, 211, 212, 216, 219, 224, 226, 229, 236, 239, 250, 282, 284; rosea, 201, 372; Roseana, 262; rufescens, 377, 379, var. paraguayensis, 377, 379; Rugelii, 205, 206, 212, 214, 217, 228, 230, 236, 290, 292, 297, 309, 315, pl. 1152; **saxicola,** 212, 225, 239, **327,** 328, 330, 363, **pl. 1153;** Schiedeana, 246, 251, 256; scopulorum, 380; Seemannii, 211, 212, 225, 239, 328, 330, 363; Senna, 203, 205, 208, 220, 378–380; sericea, 249, 351; sessiliflora, 217, 220, 234, 378, 380; **simulans,** 211, 212, 241, 323, **347,** 349; Sinapou, 200–202, 204, 205, 208, 211, 212, 216, 218, 225, 226, 228, 240, 246, 249–251, 254–256, pl. 1152; Smallii, 315; spicata, 204, 205, 209, 211, 212, 214, 220, 228, 230, 231, 235, 237, 276, 292, 297, 298, 310, 318, 380, pl. 1152, var. semitonsa, 293, 397; stipularis, 382; submontana, 212, 238, 323, 335; talpa, 332, 334; tenella, 204, 205, 208, 209, 211, 220, 289, 380, pl. 1152; tepicana, 212, 219, 224, 225, 236, 242, 318, 319, 321, 363; texana, 277; **Thurberi,** 212, 214, 215, 217, 218, 228, 238, **265**–267, 323; toxicaria, 202, 246, 249, 255, 256; velutina, 382; venosa, 382; venustula, 380; **vernicosa,** 212, 238, 242, 323, **339,** 340, 342, **pl. 1153;** vicioides, 204, 205, 208, 216, 380, pl. 1152; villosa, 204, 233, 305, 310, 311, 372, 378–380, var. flexuosa, 293; virginiana, 201–205, 209, 211, 212, 214, 215, 217, 218, 224, 225, 228, 230, 238, 267, 269, 271–276, 330, 384, pl. 1152, β. glabra, 267, var. glabra, 274, γ. holosericea, 267, var. holosericea, 274, var. leucosericea, 384; virginica, 267; viridis, 256; Vogelii, 201, 203, 205, 220, 237, 372, 376; Wallichii, 379, 380; Watsoniana, 212, 241, 351, 363
Tetrasporaceae, 4
Thistle, 33
Thrift, 367
Tiliaceae, 208
Timmia austriaca, 123
Torreya, 125
Tradescantia longipes, 116
Tragopogon pratensis, 112
Tragus, 7; Berteronianus, 7; racemosus, 7
Transfer in Liatris, A necessary, 34
Transfers and Minor Variations, 103
Trepocarpus Aethusae, 21
Trichachne californica, 20, 22; patens, 22
Trifolium pratense, 8; procumbens, 111
Trillium ozarkanum, 116; pusillum, 368, var. virginianum, 304, 368, pusillum Michx., var. virginianum Fernald, Chromosomes of, 368
Triodia Chapmani, 127; pilosa, 19
Triplasis, 6, 7; purpurea, 6
Trisetum spicatum, var. molle, 109; subspicatum, var. molle, 109
Tubiflorae, Emendations in the Order, 70–85, pls. 1144, 1145
Tussilago Farfara, 112
Two Species of Oxybaphus in Indiana, 3

Uniola latifolia, 127
United States, Potentilla procumbens in the, 390
Unusual Station for Eastern White Pine, An, 393
Upham, Ethel E., Epipactis Helleborine again, 162
Utricularia, 12; geminiscapa, 10; gibba, 12

Vaccinium, 367; albiflorum, 104; angustifolium, var. **hypolasium, 104,** var. myrtilloides, 104; canadense, 104; × corymbosum, f. albiflorum, 104, var. **albiflorum, 104;** myrtilloides, 104, f. **chiococcum, 104;** pensilvanicum, var. myrtilloides, 104; uliginosum, var. alpinum, 367
Valeriana pauciflora, 118
Varieties in Oenothera, Some, 61
Vascular Plants from St. Louis County, Minnesota, Some Corrections of Professor Jones's List of, 167
Venard, Haskell, A necessary Transfer in Liatris, 34; Ranunculus texensis Engelm. antedated by R. laxicaulis (T. & G.) Darby, 164; The White Form of Aster puniceus, var. firmus, 231

Missouri Botanical Garden Library
3 1753 00341 3736

Verbascum Blattaria, var. albiflorum, 27
Verbena ambrosifolia, f. eglandulosa, 27; bonariensis, 20, 27
Vernonia texana, 20, 28
Veronica, 38; Chamaedrys, 149; filiformis, 365, a Weed of Lawns and Gardens, 365; officinalis, 111; peregrina, 111
Veronicas, 365
Vicia, 198; angustifolia, 111; benghalensis, 198; foliis pinnatis, etc., 267; Gerhardi, 198; littoralis, 379; sativa, var. angustifolia, 111; tetrasperma, 111
Viola, 51; Rhizome-characters in and minor Forms of, 51–57, pls. 1133–1136; acuta, 54; adunca, 57, f. glabra, 57, var. glabra, 57, var. **minor, 57;** canadensis, 52, 56, 57, 167, pl. 1133; Cucullata, 57; debilis, 57; fimbriatula, 56, f. **umbelliflora, 56,** 57, **pl. 1136;** hastata, 52, 53, 57, pl. 1133, β. ?, 52, var. glaberrima, 52; incognita, 167; labradorica, 57; lanceolata, 53–55, 57, pl. 1134, var. vittata, 54, 55, 57, pl. 1134; Muhlenbergiana, β. minor, 57; pallens, 53; palmata, 108, 111; palustris, 53, 167, f. albiflora, 53; pedata, var. lineariloba, 56, f. **cuneatiloba, 56,** 57, **pl. 1136,** f. **ranunculifolia, 56,** 57, pl. 1136, γ. ranunculifolia, 56; pensylvanica, var. leiocarpa, 167; primulifolia, 53, 54, 57, pl. 1135, f. subcordata, 54, var. acuta, 54, 57, pl. 1135; ranunculifolia, 56, 57, pl. 1136; reptabunda, 54, 57, pl. 1135; rugulosa, 52, 56, 57, 167, pl. 1133; Rydbergii, 52, 57, pl. 1133; tripartitia, 52, 53, f. **glaberrima, 52,** 53, 57, pl. 1133; tripartita glaberrima, 52; vittata, 54, 55, 57, pl. 1134
Virginia, Diervilla sessilifolia in, 60; Plants, Notes on four, 12
Vitis aestivalis, 111, var. argentifolia, 111
Volvulus japonicus, var. pubescens, 73

Waterfall, U. T., A new Species of Sarcostemma from Oklahoma, 58; Some Results of a Summer's Botanizing in Oklahoma, 18
Weatherby, Bibliography of Charles Alfred, 179; Charles Alfred, Botanist and Helper of Botanists (with Portrait), 169; Charles Alfred, Death of [Notice], 152
Weed of Lawns and Gardens, Veronica filiformis, a, 365
Weigelia, 6
West Virginia, Some Grasses new to, 106
White Form of Aster puniceus, var. firmus, The, 231; Pine, An Unusual Station for Eastern, 393
Wild Senna, 203
Winterringer, Glen S., Salicornia europaea in Illinois, 11
Wire-grass, 137
Wisteria, 222
Wood, Carroll E., Jr., The American Barbistyled Species of Tephrosia (Leguminosae), 193–231, 233–302, 305–364, 369–384, pls. 1152–1155
Wood, R. D., Monographic Studies on the Characeae. I. Emendation of Nitella Morongii, 13, pl. 1119
Wood Star-wort, 100
Woodsia oregana, 167
Woodwardia virginica, 10

Xiphocarpus, 233; candidus, 374; martinicensis, 233, 374
Xyris caroliniana, 110

Zea Mays, 8
Zizania aquatica, 125, 126
Zoochlorella, 4; conductrix, 4, occurring in New Brunswick Symbiotically with Ophrydium, 4; parasitica, 4, 5